

TROPICAL DISEASES BUREAU.

# SANITATION SUPPLEMENTS

OF THE

## TROPICAL DISEASES BULLETIN.

### APPLIED HYGIENE IN THE TROPICS.

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### DISEASE PREVENTION.

BRAHMACHARI (B. B.). **Flood Flushing and Malaria in the Kumarkhali Municipality.**—*Calcutta Med. Jl.* 1923. Aug. Vol. 18. No. 2. pp. 342-347. With 1 plan.

Kumarkhali is a small town situated on the River Gorai in the hyperendemic malarious area of Bengal. The population was 6,165 in 1891, 5,484 in 1901, 3,769 in 1911, showing a drop of over 60 per cent. in 20 years. The whole of the districts surrounding the town suffer in the same way. In 1918 out of 722 children 562 or 77·8 per cent., seen by the writer, had enlarged spleens. Various measures were taken to remedy these conditions, such as cinchonization or the popularization of quinine and its alkaloids, but did not give very good results because of the indolence of the people and also of expense.

Anti-larval measures would also have been extremely difficult and expensive, so what is known as "flood flushing" was attempted.

The author does not give a very clear description how this measure was carried out and although the reviewer has visited the town on several occasions he is not quite sure that the following description is complete.

Apparently a channel about 12 ft. wide and 6 ft. deep and 3,000 ft. long was cut from a point in the town towards the river. The earth from this channel was used to extend a road. When floods came down

during the monsoon season, water in the river rose and passed in large quantities into the town. This must have practically flooded the town leaving only the roads and the houses above flood level. Apparently endeavour was made to get the water to pass into all tanks, ponds, etc., within the municipal area.

As a result of this procedure there was a marked improvement in the malaria in the town as will be seen from the figures.

SPLEEN INDEX.				
	Under one year.	One year to under 5 years.	5 years to under 10 years.	Total.
1918 ... ..	60.6	80.7	80.1	77.8
1922 ... ..	8.5	9.3	15.1	11.5

Considering the spleen rate in the various wards in the town the writer says that where there was most "flood flushing" the improvement was greatest; in places where for engineering reasons this could not be satisfactorily arranged the improvement was less.

Spleen index decreasing in Ward 3 to 4.9 per cent. of the former rate.

Spleen index decreasing in Ward 5 5.0 per cent.

Spleen index decreasing in Ward 2 15.8 per cent.

Spleen index decreasing in Ward 1 28.8 per cent.

Spleen index decreasing in Ward 4 33.9 per cent.

The cost of the measures was 2,126 rupees.

These results are very striking, and for the benefit of those who are not in close touch with anti-malarial work in Bengal, a more detailed description of the process of flood flushing is desirable.

UNITED STATES PUBLIC HEALTH SERVICE. Treasury Department.  
Public Health Bulletin No. 115. 1921. Jan. 192 pp. With  
12 figs. [70 refs.]—**Transactions of the Second Annual Anti-  
malaria Conference of Sanitary Engineers and others engaged in  
Malaria Field Investigations and Mosquito Control. Held at  
Louisville, Ky. Nov. 16-17, 1920.**

This Bulletin, a report of nearly 200 pages, contains a series of papers on anti-malarial measures read by health officers, sanitary engineers and malaria experts, engaged in the Southern States of America and is of great interest. A verbatim account of the discussion is given which much increases its value. The names of the officers taking part are well known to all who have followed the literature on this subject. Dr. LE PRINCE acted as chairman. It is impossible to do justice to the many papers, which deal with every aspect of anti-malarial work. We propose only to make a few comments on one or two.

A paper by Mr. E. JOHNSON, Sanitary Engineer, deals with oiling and larvicides and contains some new suggestions. He commences by saying that a body of water should never be oiled unless there is evidence that mosquitoes are actually breeding in it. He is a great advocate of the use of sawdust obtained from soft wood, hard and green timbers being unsatisfactory. It should be soaked in a mixture of equal parts of kerosene and crude oil for at least 24 hours. The soaked sawdust should be light brown in colour and should not contain too much oil. When ready it should be powdery and should scatter rapidly



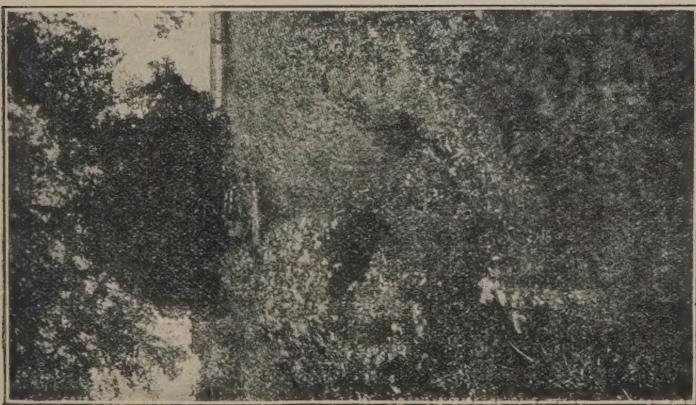


FIG. 1.—Before burning down weeds. Showing use of oil burners on maintenance work on ditch initially cleared one-and-a-half months to two months before. The cost of maintenance work, using burner, was approximately five times as much as handwork.



FIG. 2.—Burning.



FIG. 3.—After burning.

[Reproduced from *United States Public Health Bulletin, No. 115.*]

when thrown on to the water. The mixture is particularly satisfactory for use in oiling rapid running streams; for slow streams and for some kinds of ponds and pools lumps of waste soaked for 48 hours in oil are actually more satisfactory. These are pegged down in the mud at the bottom, and give off a fine film of oil for a considerable time. The method is particularly satisfactory for small seepage ditches. Both these methods are also much more economical than the ordinary hand spray. Crude creosote and "Kreso" Dip No. 1 have also been used with good results. This is apparently poison for the larvae of mosquitoes and when it is spread on the pool the larvae clinging to the bottom come to the surface and are killed. It is also useful in ascertaining if larvae are actually present in any particular piece of water. The writer considers that it is specially useful in pools that occur after heavy showers.

In the discussion Mr. PARKER recommends the use of an oil soaked mop as more convenient than the spray, particularly for such places as crab holes where mosquitoes frequently breed.

The paper on oil burners as weed killers by F. R. SHAW describes in detail the use of an ordinary fire generating apparatus which is very much on the lines of the ordinary blow lamp. Pictures show the results of its use (Figs. 1-3). Unfortunately the method is nearly 16 times as expensive as removal by hand labour, and the rate of the recovery of the vegetation is as rapid as if it had been cut down with a sickle.

In the discussion Mr. LENERT pointed out that it required four men to put out one fire as it was in considerable danger of spreading to a neighbouring timber yard.

A paper by J. G. FOSTER on subsoil drainage shows with diagrams (Fig. 4) how it is possible to increase the usefulness of what would

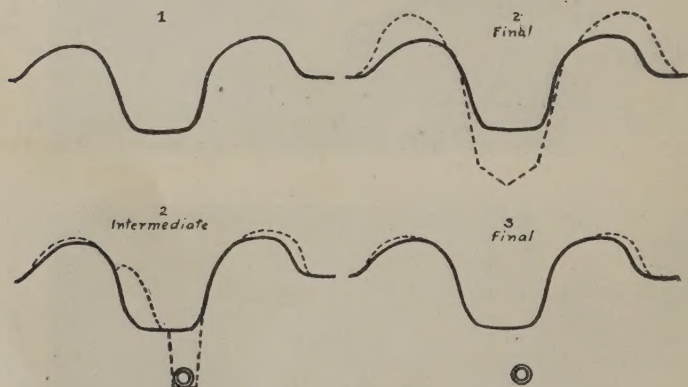


FIG. 4.—Showing elective methods for ditch improvement.

[Reproduced from the *United States Public Health Bulletin*, No. 115.]

be called the kutchra drain in the East, by putting pipes in below the earth invert. He suggests that second quality pipes of the spigot and bell design are fairly satisfactory, because there is no necessity to "make" the joints. Inequalities in the manufacture do not render them unsatisfactory. In the sand the joints may be packed with oakum or rags; for most ordinary light earth nothing is required.



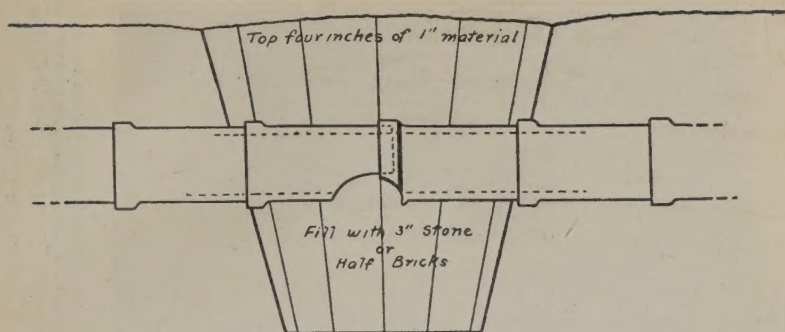


FIG. 5.—Rough filter for use in drainage operations. Protect bore of pipe from intrusion of filter material by wrapped mesh fabric, galvanized, or sloping set iron rods, or by junked domestic grate basket parts.

[Reproduced from the *United States Public Health Bulletin*, No. 115.]

He also gives a picture (Fig. 5) of a filter on a subsoil drain. The chamber is filled with 3-inch broken stone and brickbats; a hole is cut on the under side of the drain, as shown in plan. The surface is best covered with a fine grade material to prevent stones being removed.

NATIONAL MALARIA COMMITTEE [U.S.A.]. **Malaria and the Engineer. A Treatise for Technical Students.** Prepared by the Committee on Sanitary Engineering of the National Malaria Committee. Published by St. Louis Southwestern Railway Lines. [St. Louis, Mo.] 1922. 20 pp. With 10 figs.

This is a short treatise on malaria suited to the needs of engineering students, drawn up by four gentlemen whose names are well known in the literature of malaria in America.

The work is as non-technical as possible. It deals with the life history of the mosquito and conditions that are necessary to produce malaria. Most particularly interesting, from the medical point of view, are sections 4 and 5, which deal with "ways in which engineering projects increase the prevalence of malaria" and "how the engineer can avoid creating malaria." Undrained borrow pits, defective drainage construction, suburban road ditches, etc., are discussed at considerable length. The four measures given as suitable for avoiding malaria are, drainage, drainage maintenance, fish control and the application of larvicides.

The following short extract and the pictures reproduced (Figs. 6-11) give a good idea of the scope of the work.

Summary of what to do and what not to do :—

"(a) In areas in the United States where malaria prevails, don't fail to consider standing or sluggish water as a menace to health and its removal or control probably of great importance.

"(b) Consider undrained borrow pits as a potential danger that should not be allowed.

"(c) Whenever possible, culverts must be so placed as to drain the bottom of all wet lands in the culverts drainage valley, and not to interfere with future small drainage projects on farm lands, etc.



FIG. 6.—A typical city stream before ditching and clearing of vegetation.

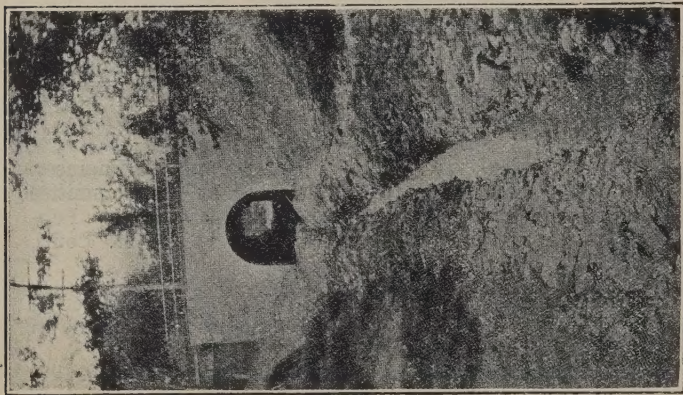


FIG. 7.—The same stream after ditching and clearing to prevent mosquito production.

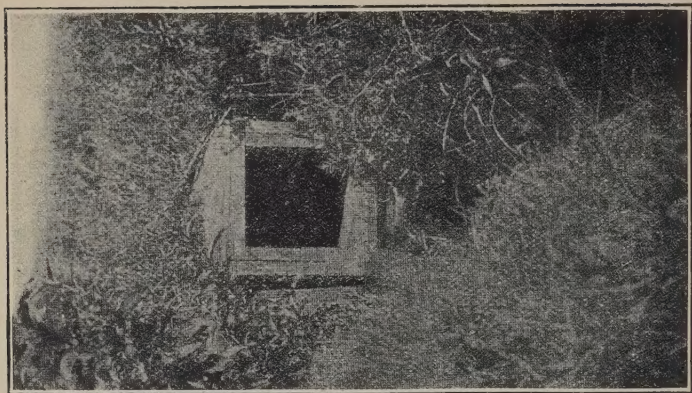


FIG. 8.—A road culvert placed at too high an elevation to drain completely—a "man-made" mosquito producing area.

[Reproduced from *Malaria and the Engineer*.

*A Treatise for Technical Students. Prepared by the Committee on Sanitary Engineering of the National Malaria Committee.]*



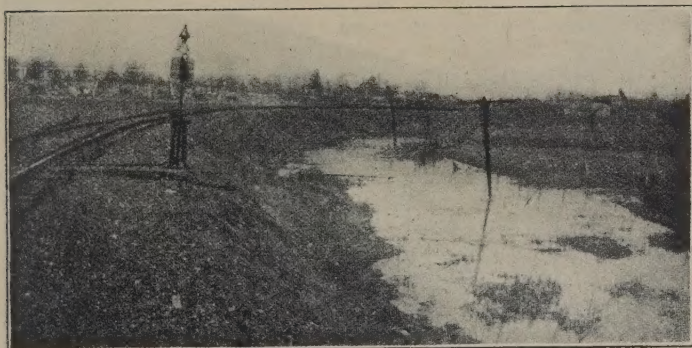


FIG. 9.—A typical “man-made” railroad borrow pit that produces many mosquitoes because it cannot be drained.



FIG. 10.—A typical ditch made with dynamite.

[Reproduced from *Malaria and the Engineer. A Treatise for Technical Students. Prepared by the Committee on Sanitary Engineering of the National Malaria Committee.*]

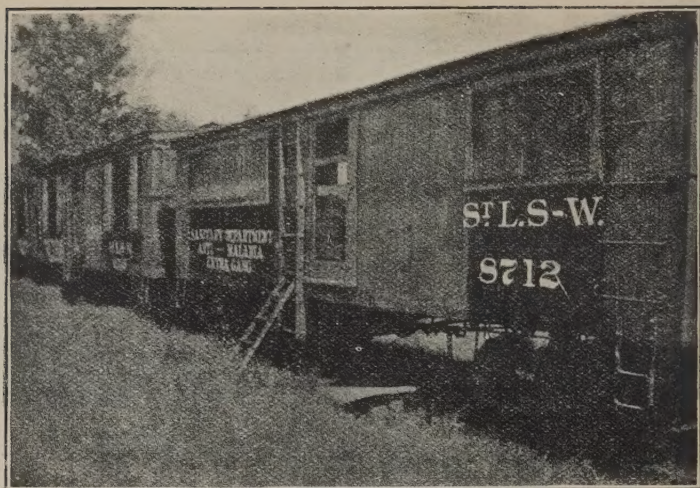


FIG. 11.—A typical railroad camp on wheels. Note that the windows and doors are screened to keep out mosquitoes.

[Reproduced from *Malaria and the Engineer. A Treatise for Technical Students. Prepared by the Committee on Sanitary Engineering of the National Malaria Committee.*]

“(d) Do not attempt to drain seepage outcrops with ‘crowfoot’ ditches when intercepting ditches are necessary. In making intercepting ditches, the excavated material should be placed on the down hill side of the ditch.

“(e) Do not allow contractors or others to dig wide bottom ditches along highways and railroads where narrow bottom ditches can be used, and see that those ditches are dug to proper grade so as to retain a minimum of stagnant water.

“(f) Do not fail to use your influence for the proper maintenance of roadway and railroad ditches, particularly near settlements, villages and towns.

“(g) Municipal engineers should advise town commissioners to have all roadside pools eliminated, to prevent water standing in roadside ditches in town suburbs, and make every effort to have this necessary work accomplished.

“(h) It will be found economical to line the bottom portion of Anopheles producing ditches in town suburbs with concrete, or use drainage pipe, in place of maintaining an open ditch.”

DI GIOVANNI (I.). [**La lotta antimalarica in una miniera di zolfo.**] [Anti-malarial Campaign in a Sulphur Mine.]—*La Miniera Italiana*. 1923. No. 2. [Summarized in *Ann. d'Igiene*. 1923. May. Vol. 33. No. 5. pp. 364-365.]

The atmosphere and water of sulphur mines are believed to be fatal to Anopheles, but the water at a depth of 200 metres is nearly neutral and abundant larvae of Culex and Anopheles were found in it.

In 1921 amongst 300 labourers on one sulphur mine 231 suffered



from malaria (77 per cent.) ; of these only 93 were relapse cases, the remainder being primary attacks. This prevalence was ascribed to the fact that the labourers used a large amount of water for which the drainage was inadequate. Screening was not practicable since the metal is corroded by the sulphurous acid gas. Better regulation of the water supply, drainage, quinine prophylaxis and intensive treatment of patients during winter and spring have yielded excellent results, and in 1922 there was only one case.\*

**CATALUNYA. El Paludismo en el Bajo Llobregat. Actuación de la Comisión Mixta ejecutiva para la Lucha Antipalúdica en el Bajo Llobregat desde diciembre de 1921 a noviembre de 1922.**—36 pp. With 1 graph. 1922. Barcelona.

A mixed Executive Commission appointed to deal with malaria in the Llobregat delta, Barcelona, finds that marshes produced by a barrier of sand, and rice fields, constitute an ideal intensive nursery for Anopheles. Drainage of the marshes into a central canal, oiling, quininization, insistence that over rice land the water shall always move at a rate faster than 10 metres a minute, are its main recommendations.†

**MADRAS. The Fifty-Ninth Annual Report of the Director of Public Health and the Thirty-Third Annual Report of the Sanitary Engineer Madras 1922.** [RUSSELL (A. J. H.), Director of Public Health and WESTERDALE (J. S.), Offg. San. Engineer to Gov.].—pp. 101+5. With 5 graphs and 1 map. 1923. Madras: Supt. Govt. Press. [Price 14 annas.]

An epidemic of relapsing fever occurred in the Tanjore and Trichinopoly districts. Its maximum was from January to March 1922 ; up to the end of January there had been 9,060 cases with 3,282 deaths, or 33·3 per cent. mortality. In some villages the death rate was as high as 66 per cent. In several other parts of the Madras Presidency similar outbreaks were reported. The Sanitary Commissioner reports that the infection has gradually spread into other Presidencies. Major CRAGG who has been investigating the outbreak in the north thinks that the climatic conditions of Madras are unfavourable, and that the fever will probably not appear in epidemic form in any one area for more than two years.

**UNITED STATES PUBLIC HEALTH SERVICE. Treasury Department. Public Health Bulletin No. 108. 1920. Oct. 6 pp.—Transactions of a Special Conference of State and Territorial Health Officers with the United States Public Health Service for the Consideration of the Plague Situation. August 3 and 4, 1920.**

At the meeting of City Health Officers held in 1920 at Galveston, Texas, some very interesting facts as regards the habits of rats in the southern states of U.S.A. were discussed.

"The Norway species (brown or grey rat) is essentially a burrowing animal, living chiefly under floors and in cellars. This species is more readily trapped than the others, and because of its burrowing habits, rat-proofing measures are most effective against this species. On the

\* Summarized by Dr. H. Harold SCOTT.

† Summarized by Lt.- Col. Clayton LANE.

other hand, the *rattus* and *alexandrinus* do not burrow and in the United States live almost exclusively indoors, within loosely piled material, merchandise, hollow spaces and are most often found overhead. They are notoriously trap-shy, but snap traps placed on beams and in similar overhead runways will prove very effective. It naturally follows that rat catching and rat proofing are of less value against the *rattus* and *alexandrinus*, and experience has demonstrated that a building absolutely rat proof, as far as construction is concerned, will harbour, when filled with stored material, an immense number of these species. Fumigation (preferably by cyanide gas) is the effective measure to be employed against the *rattus* and *alexandrinus*."

Rats are very seldom found in goods trains in the U.S.A. This is attributed to the fact that *rattus* and *alexandrinus* are comparatively rare, as this variety constitutes the tourist element in the rodent population. The daylight loading of freight cars and the prohibiting of cars from standing open alongside of loading platforms during the night would seem to embrace all reasonable precautionary measures to prevent the spread of plague in overland carriers.

BOUFFARD (G.). **La chloropicrine dans la lutte contre la peste à Madagascar.**—*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 602-605. [2 refs.]

The writer discusses the use of chloropicrin for ridding towns in Madagascar of rats and rat fleas, and after 18 months' experience, during which a thousand houses have been treated, comes to the conclusion that it is a very powerful agent for the destruction of both. It is also a sound disinfectant and is free from danger but causes a certain amount of nuisance to the staff who handle it.

A concentration of 5 grams per cubic metre appears to be the minimum to secure thorough action on fleas; rats are much more sensitive and for them 2 grams per cubic metre is sufficient.

Considerable difficulties are met with where the roofs are made of thatch; in the rat runs, however, it is extremely efficient.

The heaviness of the chloropicrin vapours adds to the effectiveness.

UNITED STATES NAVAL MEDICAL BULLETIN. 1923. Nov. Vol. 19. No. 5. [Notes and Comments.] p. 696.

"We learn from *Science* of December 15, 1922, that a new method of killing rats, now being tried out in Hawaii, consists in distributing poison cakes through the sugar-cane fields and non-cultivated areas. The poison used is barium carbonate. This is mixed with flour dough, which is then made into small round cakes and coated with paraffin to protect them from dampness and molding.

"A man on horseback dropping a rat cake every 10 feet can cover an area of 35 acres in a day, at a total cost of 16 cents per acre. This procedure repeated three times a year is reported as sufficient to control the rat pest on the islands."

HANCOCK (George C.) & WHITE (P. Bruce). **Report on an Outbreak of Dysentery in the Urban District of Lynton, Devon.**—*Ministry of Health. Reports on Public Health and Medical Subjects No. 20.* 17 pp. 1923. London: H.M. Stationery Office. [Price 4d. net.]

The epidemic was due to the fact that in one dairy farm out of ten the owner and the foreman were suffering from dysentery which they



had no doubt contracted during the war. The foreman was found to have a mixture of Shiga and Flexner Z types and the farmer Flexner. In all there were 18 cases in 11 households, 13 being in children and 5 in adults. Multiple cases occurred in five households.

The infected farm supplied 52 households in the town, 17.3 per cent. of which had at one time or another serious cases of dysentery. There were no less than 4 deaths; the cases were spread over a period of four months. No explosive onset, such as is found in water-borne disease, was recorded.

LOPEZ RIZAL (L.). **Typhoid Investigation. Epidemiological Report on Typhoid of 1922.**—*Monthly Bull. Philippine Health Service.* 1922. Oct.-Dec. Vol. 2. Nos. 10-12. pp. 303-356. With 4 maps and 2 charts.

In the year 1922 there occurred, in the town of Manila, a serious outbreak of enteric, which was very carefully investigated by the writer. He gives a long and valuable report of the work. His findings are of interest as well as his recommendations.

**Summary of findings:—**

" 1. The centre of incidence of the present typhoid fever epidemic does not coincide with the centre of population.

" 2. The incidence is very much higher (a) in the districts located on the north side of the Pasig River; (b) more among Japanese than among other nationalities; (c) among males; (d) in the groups of population from 11 to 20 and from 21 to 30 years of age; and (e) among the unvaccinated people.

" 3. The case fatality of the present epidemic is 27.75 per cent. among city cases, and the mortality is 1.53 for each 1,000 of population. The fatality and mortality figures keep, however, no relationship with the incidence. The fatality in cases kept and cared for at home is remarkably higher than the cases treated in hospitals. The fatality is, further, in inverse proportion to the duration of time elapsed from onset to the date the case is reported. The fatality of the present epidemic is remarkably lower than the fatality observed in the last six years, with the exception of that corresponding to 1918.

" 4. There is still a relatively large proportion of cases that are not reported except when already dead. No mortality among persons who have received the complete series of inoculations prescribed (two c.c. of the mixed typhoid and cholera vaccine or 2.5 c.c. of the T.A.B. vaccine).

" 5. Typhoid infection predominates over that of paratyphoid A and B with the interesting particular that among carriers, paratyphoid A infection is the more prevalent.

" 6. Late reporting of cases and ineffective isolation in houses are instrumental in the large percentage of contact and secondary infections.

" 7. Immediate contact infection is responsible for a good proportion of cases, but a larger one is probably due to contaminated water, milk, ice cream, and other food-stuffs on account of faulty handling.

" 8. The water supply and the sanitary sewer system are apparently not to be considered causes of the present epidemic.

" 9. The most important factor that influenced the present outbreak is assumed to be the large amount of uninspected 'ice-drop' and the kindred 'frozen sugar-water' consumed during and before the Carnival

season. No other factor can reasonably be admitted to explain, partially at least, such a quasi-massive infection a little before, during and after the Carnival Week.

" 10. Carriers' control is a factor that has not been given proper attention in the past. It is estimated that there are not less than four carriers to every 1,000 of population in the City of Manila. There are 4.71 convalescent carriers for each hundred cases; 1.18 carriers in every hundred contacts; 3.15 per cent. among water-carriers and 1.22 per cent. among food-handlers.

" 11. Isolation, as found by the Committee, is relatively better practised in hospitals than in private houses. In general, however, it is not so effective or practical as it should be.

" 12. Diagnostic methods are unsatisfactory and defective.

" 13. Vaccination against typhoid was found to be, to a certain extent, ineffective since a large majority of the reports gives a great percentage of people having been given a single injection only. Typhoid inoculation, on the other hand, either using the mixed cholera-typhoid or the T.A.B. preparation, *if the series is completed*, seems to afford a good protective measure and an effective means of controlling an epidemic.

" 14. Supervision of the prepared foods and water, food-stuffs, ice cream, ice-drops, etc., has been somewhat neglected and the enforcement of certain regulations relaxed.

General recommendations :—

" 1. General sanitation, as refers to waste disposal, garbage, and other refuse, its use as a filling material, flies campaign, drainage, etc., must be given more attention.

" 2. The water supply of the City of Manila must be improved by bettering the water treatment methods now employed.

" 3. Strict supervision of and enforcement of sanitary rules and ordinances in all factories and other public places used as centres of distribution of foods and food-stuffs. Similar supervision must be exerted over all food handlers.

" 4. The campaign for the search and discovery of typhoid and paratyphoid carriers must be continued as routine work. Incubation carriers, contact, convalescent, and chronic healthy carriers, especially among food-handlers, must be the subject of preferent attention.

" 5. The follow-up and control of carriers is a very important factor and should not be overlooked.

" 6. Prompt reporting of cases must be secured from all physicians and hospitals.

" 7. Diagnostic methods must still be improved. The Philippine Health Service must furnish all facilities for laboratory diagnosis.

" 8. Isolation and nursing methods in hospitals must be effective and carried out more or less in accordance with the regulations recommended by the Committee.

" 9. Incomplete individual vaccination should not be permitted."

HUBBARD (John C.). **Influenza Quarantine.**—*Proc. Med. Assoc. Isthmian Canal Zone.* 1920. Jan.-Dec. Vol. 13. Pts. 1 and 2. pp. 99-101.

The writer gives the results of his experience of the 1918 influenza epidemic. Attempts were made to protect the public in the following



ways : masks worn over the face, nasal sprays, throat gargles, disinfectants, serum and vaccine ; none was very successful, but it is only fair to state that conditions of travel were decidedly abnormal as a result of the war.

The writer's final opinion is :—

" We feel reasonably sure that if we can isolate the active cases and carriers we can prevent its spread, as was demonstrated on the Canal Zone in this year's epidemic . . . . .

" The regulations for the Canal Zone ports were, in part ; ' If there have been no cases during the voyage, and careful examination of passengers and crew reveals no sickness, a general quarantine is inadvisable. If cases have existed or are found on board, the following is advised :—'

" 1. Taking temperature of those apparently well.

" 2. Removal of the seriously sick to the hospital.

" 3. Removal of those recovering or slightly sick to quarantine station. "

" 4. Officers and crews to remain on board at least 2 days after the removal of sick.

" 5. Detention for 2 days, preferably at quarantine, of passengers who have been in contact with the sick. Unless unusual precautions have been taken, this will include every one on an infected ship.

" 6. Those exposed and quarantined as per paragraph 5 should, when released, be instructed in writing to report daily for 3 days to the health officer or district physician nearest their destination, etc.

" These regulations proved to be a great help during 1918, and no doubt were largely responsible for the protection of the Zone from infection, but, in the writer's opinion, 2 days is insufficient time for observation, and there is no provision for a vessel that is only 2 to 4 days from an infected port and there is no method suggested for the disinfection of the carriers."

The article also refers to the measures against influenza used in Australia : 14 days' quarantine for all infected vessels, daily inspection of all contacts and removal of cases with a temperature of 99° to a quarantine station, the contacts being treated with nasal and throat douches of zinc sulphate.

ALEIXO (A.). **A organização dos serviços antivenereos no Estado de Minas e, mais especialmente, na sua Capital.** [The Anti-Venereal Campaign in the State of Minas, particularly in the Capital.]—*Brazil Medico.* 1923. Nov. 3. Year 37. Vol. 2. No. 18. pp. 271-274. [1 ref.]

Nine dispensaries have been set up, two in the Capital and seven in the interior. Details are given of 7 dispensaries. At one in the Capital, established in 1921, there had attended 4,281 patients with syphilis, 1,408 with gonorrhoea, 816 with soft sore. Prophylactic measures may be summed up as consisting of treatment, educational methods, and examination of prostitutes. It is estimated that 95 per cent. of the latter presented themselves. Efforts are made to trace the source of any fresh case that arises.

Syphilis has been greatly reduced, namely from 16.6 per cent. in March 1922, to 4.7 per cent. in August 1923, at the Central Dispensary referred to above, but other venereal infections show no such improvement. Thus, gonorrhoea and soft sore in March 1922 were 18.8 and

15.1 per cent. respectively, whereas in August 1923 they were 20.1 and 15.8 per cent.\*

SAWYER (W. A.). **Advantages of Nation-Wide and International Organization for Disease Control, with Special Reference to Hookworm Disease and Beri-Beri.**—11 pp. 1923. Singapore: Govt. Printing Office. [5 refs.]

The writer commences the article with the following paragraph:—  
“A new governmental health function is apt to develop in several stages. In the first, the underlying facts are uncovered in the laboratory and the field, and the public health dreamers of dreams conceive plans for applying the new knowledge for the benefit of the people's health. The second period is a prolonged interval of delay and preparation during which the problem is gradually forced into world-consciousness through discussion. Then there may follow the third stage, the exhilarating campaign period, in which the movement is in the lime-light and methods are rapidly improved through abundant experience and the clash of many minds. Finally the project settles down into its place as one of the recognised permanent functions of government.”

Making use of the hookworm statistics in Australia, he argues the case for a national and international organization of direct operation practically throughout the world. He quotes from Dr. SWEET'S report the results of the anti-hookworm investigation up to 31st. Dec. 1922 [see this *Bulletin*, Vol. 20, p. 954]. The tables are too long to be given here in extenso, but in endemic areas there were 10.5 per cent. of the population infected on a gross total of 145,000; in non-endemic areas there were .8 per cent. of the population infected on a gross total of 50,000 persons. Special investigations in Papua gave 59.2 per cent. New Guinea 74.2 per cent., Endemic Coal Mines, Queensland 38.5, and Hospital for the Insane in Queensland 16.6 per cent. The regions investigated include many tropical areas with a rainfall from 50 ins. to as low as 10 ins. Under the conditions found in Queensland hookworm infection in people of European origin was very high where there was more than 50 ins. of rain in a year and as a rule almost absent where the annual rainfall was less than 40 ins.

“After the work was well under way, the important observation was made that the methods used at first were too intensive, and that better results could be gained if less effort was devoted to securing complete cures of all infected persons, and more emphasis was placed on visiting the communities often, under a systematic scheme of permanent hookworm control. There was much evidence to show that for a given set of conditions there is a level at which the hookworm infection rate is at equilibrium.”

In Papua and New Guinea much relief was obtained by mass treatment of the populace, the education necessary to get these people to use latrines being naturally rather a slow process.

The writer's remarks on beriberi will be dealt with in another review.

PUBLIC HEALTH REPORTS. 1923. Oct. 12. Vol. 38. No. 41. pp. 2368-2370. With 1 plate.—**Campaign against Hookworm in the Province of Cebu, Philippine Islands.**

The writer gives an account of an anti-hookworm campaign in the province of Cebu in the Philippine Islands. At the outset, notice of

\* Summarized by Dr. H. Harold Scott.



the intended operations was given through the Municipality and schools. On the day of examination circulars were distributed with the following instructions.

"(a) Come to-day to be weighed and to receive an identification card.  
 "(b) Do not eat anything to-night or to-morrow morning.  
 "(c) Come early to-morrow morning to.....(name of place where treatment is to be given.)

"(d) Come provided with a mat (on which to lie down), and a basin.

"(e) Come early and be examined by Dr.....

"(f) Bring your identification card."

Pictures were freely distributed of the following :—

"(a) Pictures of adult hookworms and eggs.

"(b) Insanitary privy showing how hookworm is spread.

"(c) Young worms entering the body through the skin.

"(d) Sketch of the body, showing route of worms when entering, including veins, arteries, heart, lungs, trachea, esophagus, stomach and intestines.

"(e) Illustrations showing lowered resistance of victim, making him an easy prey to other diseases.

"(f) Modes of spread of hookworm disease and other diseases due to improper disposal of human feces.

"(g) Sketch of an intestine bearing hookworms, some of which are hanging to the intestinal wall.

"(h) Sanitary toilet.

"The medicine used in the treatment was purified carbon tetrachloride, put up in bottles of one liter capacity. One cubic centimeter was given for every 5 kilograms of body weight, the maximum dose being 12 cubic centimeters. Advanced heart, liver, or kidney diseases were considered as contra-indications, as were also pregnancy and edema, unless the latter was due to hookworm infection.

"Of the 2,556 persons treated, only 7 showed resulting untoward symptoms. In three cases there was great weakness. These patients were treated by injections of strychnine and camphor and recovered. In four cases there was excessive vomiting, which was treated with injections of morphine and strychnine; and in the case of one child, paregoric was given in tea."

The results of the examination of the dejecta are given below.

		Dumanjug.	Ronda
		Per cent.	Per cent.
Infection with one or more species of intestinal parasite ...	...	100	100
With hookworm ...	...	93	82
With ascaris ...	...	83	70
With trichuris ...	...	76	40

The 2,556 patients were treated in 18 days, an average of 142 per day and a maximum of 435. The continuation of lectures, posters and treatment proved very satisfactory and popular.

**FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE.** Statements laid before the Committee on Beri-Beri Control and the Resolution recommended by the Committee as amended by the Council and passed at the General Meeting of the Fifth Congress of the Far Eastern Association of Tropical Medicine, 1923.—12 pp. 1923. Singapore: Govt. Printing Office.

The subject of beriberi was much discussed at the 5th Congress of the Far Eastern Association of Tropical Medicine by the delegates from

Indo-China, Philippines, Japan and Formosa, India, Australia, Siam and Dutch East Indies. Many conflicting opinions were expressed and the administrative difficulties of the proposals were brought out by many speakers.

The result of the deliberations is given in the following resolutions.—

“The Association is of opinion that, consequent upon the divergence of views disclosed in the statements of the official delegates, any international convention is at present impracticable.

“The Association reaffirms its opinion that beri-beri is a disorder of nutrition, and that in the Far East the principal factor in its causation is a diet of which overmilled rice forms the staple.

“The Association recommends that interested Governments be invited to promote further research in the following questions in relation to beri-beri control :—

- (a) the standardisation of rice ;
- (b) the effects of transport and storage on rice ;
- (c) economic considerations.

“The Association recommends that each of the Governments interested and the International Health Board of the Rockefeller Foundation be invited to nominate a representative on a ‘beri-beri committee’ which shall report at the next Congress. The names of such representatives should be notified to the General Secretary-Treasurer.

“The Association considers that, in the meantime, individual Governments should take such action for the control of beri-beri as may be suited to local conditions in their respective countries, and should devote special attention to devising and applying practical methods of improving the diet of the general population with regard to the too exclusive use of over-milled rice, and should be requested to make available to the next Congress of the Far Eastern Association of Tropical Medicine systematic observations and statistical data showing the results of these methods.

“The Association considers that educational methods of control on the bases of the available scientific knowledge should be vigorously applied in all countries.”

CATHCART (G. E.). **Notes on the Use of Artificial Light in Sandfly Destruction.**—*Jl. Roy. Army Med. Corps.* 1923. Dec. Vol. 41. No. 6. pp. 447-450. With 2 figs.

The writer gives an account of his experiences in Irak with the use of an ordinary hurricane lamp in the destruction of sandflies at night. He observed that if a lighted hurricane lamp, carefully smeared all over with vaseline, were hung at a certain distance from the beds, it became coated with sandflies and in this way destroyed many thousands of these pests. Also that by rubbing a chemical repellent on the exposed skin it was possible to obtain a fair night's sleep. He considers that this matter is worthy of further and more exact investigation and also suggests that possibly the hurricane lamp plan might work with mosquitoes.

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## WATER.

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1923. Sept. 7.  
Vol. 64. No. 1651. pp. 167-169. With 3 text figs.—**Rand  
Water Supply. Description of the Vaal River Scheme.\***

The main feature of this scheme is the construction of a barrage across the Vaal River near Vereeniging which will create a lake capable of impounding 13,633 million gallons. The length will be about 40 miles and the width 4,000 ft. ; submerged area  $6\frac{1}{2}$  sq. miles and depth of water at the barrage 25 ft. 1 in. The water brings down a large quantity of silt in the wet weather, estimated at 1,200,000 tons. The original width of the river at the barrage site was 620 ft. but the length of the barrage is 1,400 ft.

"The water from the river intake station, before being delivered into the sedimentation tanks, is treated with sulphate of alumina and the water is then run along a trough arranged with baffles, so that thorough mixing takes place. The water then enters the sedimentation basins, four of which have been constructed to deal with a total of 6,000,000 gallons per day. The sedimentation tanks are 260 ft. long, 70 ft. wide, and have an average depth of about  $8\frac{1}{2}$  ft. ; the capacity of each tank being 800,000 gallons.

"Temperature variations in the long concrete side walls have been provided for by inserting expansion joints made of V-shaped copper plates. The walls and floor slabs are of reinforced concrete, and the slab is laid on a 9-ins. bed of puddle.

"The slow passage of water through these tanks enables the flocculent precipitate, caused by the sulphate of alumina, to settle at the bottom, and carry down with it the greater portion of the suspended matter and bacteria. It is anticipated that over 80 per cent. of the bacteria will be removed in the tanks by adding from  $1\frac{1}{2}$  to 3 grains of sulphate of alumina per gallon of water. After the water leaves the sedimentation tanks it is passed through a set of eight Paterson filters, and the clear water from these filters is collected in a reservoir holding 200,000 gallons situated in the basement under the central portion of the filter house.

"The sludge, which will amount to about 8,500 tons per annum, is removed by washing it to a central drain, and then into a sump from which a pipe has been laid to a site about 2,700 ft., distant from the main station. The sludge gravitates to the site in question, and it is then spread over an area of land 30 acres in extent."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1923. Oct. 12.  
Vol. 64. No. 1656. p. 265.—**Deferrising Water in Berlin.**

"Water at Berlin is derived from wells, and has an iron content which has doubled during the last six years. It also contains hydrogen

\* Works necessary to bring a supply of 5 million gallons a day from the Vaal River to the Rand were commenced in 1920, and this unit, which includes a large barrage, was formally inaugurated by Prince Arthur of Connaught on July 27th. A second unit of 5 million gallons a day has been approved, but the work has not yet been put in hand.

sulphide and carbon dioxide, and the volume treated by the new plant is over 17,000,000 gallons per day in the summer months. The Berlin water was formerly treated for iron removal by aëration and slow sand filtration, but in the new iron and manganese removal plant, impinging jet aërotors are used with prefilters or scrubbers, and the water is then treated in mechanical rapid filters. Both sets of filters are worked at high rates. An injector wash is used in the final filters after the ordinary reversed flow and compressed air wash has become ineffective. The ferrous iron in the water is oxidised rapidly by the aëration, and is precipitated, and the hydrogen sulphide and carbon dioxide present in the water are removed at the same time. The drops of water from the aërotor are caught on prefilters containing gravel from 6 to 10 mm. in gauge, 24 in. deep, resting on a false bottom of perforated copper plates and covered with a copper screen in order to prevent displacement in washing. When the gravel has become clogged with iron the filter is washed by reversing the flow. The treatment is very efficient. It is noteworthy that the wells from which this supply is drawn, 154 in number, some of which are 200 ft. deep, are lined with seamless copper tubes."

O'CALLAGHAN (J. P.). **Modern Methods of Water Purification.**—*Surveyor & Municipal & County Engineer.* 1923. Sept. 14. Vol. 64. No. 1652. pp. 195-196.

The permutit zeolite process.—

"The name 'zeolite' was applied to the hydrated silicate of alumina combined with sodium, potassium, calcium, magnesium, and other metals. These substances possessed the remarkable property of exchanging their metallic bases for others under appropriate conditions of contact, and of effecting the exchange in the reverse direction. For instance, a zeolite containing sodium as its base was able to replace the sodium with calcium if exposed to contact with a solution of a calcium salt. When the calcium zeolite had been formed, it could be readily reconverted into the sodium salt by similar treatment with a solution of sodium chloride. By the power of base-exchange which permutit possessed 'permutit' was the name adopted for the water softening zeolites—both calcium and magnesium were completely removed from water which had passed through a permutit softener. All traces of hardness disappeared, and the water, when tested, gave a ready lather with a minimum quantity of soap. The softeners were without moving parts, the entire process consisting of the simple filtration of the hard water through a bed of the permutit material. The installation of plant of the largest size, therefore, presented little difficulty, while, as regards the permutit itself, depreciation was a practically negligible item, and the labour required to operate was exceedingly small. As the softening power of a permutit plant was drawn upon by the water itself in exact accordance with its hardness and its rate of flow, it followed that permutit softening precluded the possibility of under-treatment or over-treatment. Variation in the quality and quantity of the water within the limits of the capacity of the plant made no difference, whereas in such cases of variation a lime-soda water softener would require frequent readjustment.

"The permutit system worked equally well whether operated under pressure or by gravity, and, in consequence, a softener could be fixed to the water service at any convenient level. This frequently saved



double pumping, and allowed of a practically unrestricted choice of position for the softening plant.

"The base-exchange softening action continued until the active sodium in the permutit molecule had been entirely replaced by calcium and magnesium. When this point had been reached, regeneration was effected by passing a solution of sodium chloride slowly through the filter; by this means the calcium and magnesium, as soluble chlorides, were expelled from the permutit, their place being taken by sodium from the salt solution, thus reconstituting the original sodium permutit, which was then as fresh and active as when first put to work. The alternating cycle of softening and regeneration was capable of indefinite prolongation. Permutit filters, which had been in uninterrupted use for fifteen years, and had been regenerated many thousand times, were still delivering water of zero degrees of hardness containing not the slightest trace of lime or magnesia."

FOWLER (Gilbert J.). **Bio-Chemical Factors in Modern Methods of Water Purification.**—*Surveyor & Municipal & County Engineer.* 1923. Dec. 28. Vol. 64. No. 1667. pp. 523-524.

The writer gives an account of what may be termed the true natural forces at work in a surface water, whether it be river or lake. He reviews also the subject of chlorination of drinking supplies.

The writer, it must be remembered, is the discoverer of the Activated Sludge process of sewage purification. He considers that something akin to this process is actually going on slowly in the rivers in tropical countries. He instances the conditions which he found in the river Yangtsze, which flows through plains that are extremely heavily manured with sewage.

"The water of the Yangtsze and its tributaries exhibits but slight signs of pollution save the presence of nitrates, the products of oxidation of sewage. The water, however, is heavily charged with finely divided silt, and it occurred to me that this silt served as a nidus or scaffold for the necessary bacteria of oxidation, and that consequently self-purification took place very rapidly, and that we had really to deal with an activated silt which purified the polluted water much in the same way that activated sludge purifies sewage."

The inference drawn by the writer is that a modification of the aëration process, which is the foundation of the activated sludge treatment, would probably be found extremely useful in oxidizing the impurities in a drinking water.

BONNE (C.). **Ervaringen met mechanische snelfiltratie en chloorbehandeling van rivierwater te Moengo, Suriname.** [Results of Filtration and Chlorination of River-Water at Moengo, Surinam.] —*Tijdschr. v. Vergelijk. Geneesk. enz.* Leyden. 1923. Nov. 14. Vol. 9. No. 4. pp. 316-330. [English summary pp. 330-331.]

Summary.—

"Filtration of dark but non-turbid and not heavily polluted river-water in Surinam with a mechanical pressure filter after addition of alum, soda and chlorine gas has given satisfactory results. Details about chemical analysis, number of bacteria, coli reactions, amount of colour, etc. in riverwater and filtered water and also a description of the plant, difficulties and costs of operation, can be found in the original article."

## Illustrating Wood (C.I.).]



FIG. 12.—Method of boiling drinking water for use in camp. Front view of furnaces, showing drums in place. The door to the furnace at the right is removed to show the inside of the fire-box. The collecting and cooling tank is shown to the right of the furnace.

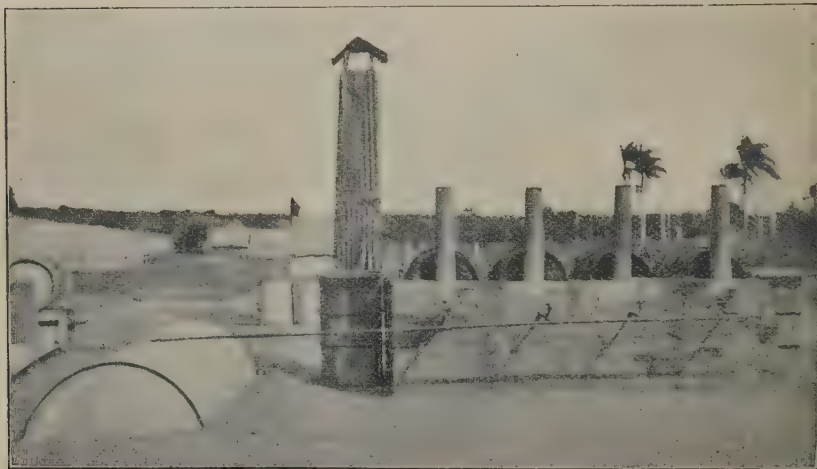


FIG. 13.—Rear view of furnace, showing smokestacks and pipes for transferring the boiler water from the drums to the tank.

[Reproduced from the *United States Naval Medical Bulletin*.]



WOOD (C. I.). **A Method of boiling Drinking Water for Use in Camp.**—*U.S. Nav. Med. Bull.* 1923. Aug. Vol. 19. No. 2. pp. 166-167. With 2 figs.

The writer describes an ingenious way of providing boiled water for a garrison of 300 men stationed at Santiago, Dominican Republic. He used large gasoline drums, building a grate with masonry. The pictures explain this and do not require description.

Dotted all over the Bush in Central Africa and in many camps in Mesopotamia would be found very similar arrangements made by our forces during the war, the only difference being that nothing so satisfactory as these steel gasoline drums was available; recourse had to be made to the kerosene oil can and the structural arrangements were practically always of mud.

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## FOOD.

BALFOUR (Andrew). **Some Food-Stuffs in the Tropics.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. June 21. Vol. 17. No. 3. pp. 151-176. [60 refs.]

This paper is a complete review of the vexed question of the milk supply in tropical countries, and also deals with several other articles of diet, particularly cereals, soya beans, ground nuts and tropical fruits.

The writer points out that tuberculosis amongst cattle in hot countries is well known to be comparatively rare. He quotes analyses of milk from BLACKHAM'S and JOSHI'S work in Bombay.

As regards remedial measures for the state of the milk industry he considers that very little can be done in the present state of education in most oriental countries. With this we are in entire agreement. The following points are well known to all sanitarians in the East:

- (1) That any remedial measure enforcing pure milk puts the price up beyond the means of the ordinary town dweller.

- (2) That the native milk vendor or cow owner can always succeed in defeating any legal enactment that is made with the endeavour to improve the quality.

As the writer points out, there is only one remedy, and that is to create a demand for the pure article, which certainly does not exist at the present time.

As substitutes for milk, condensed and dried milk are dealt with. The writer believes that the demand for dried milk in tropical countries is likely to increase, particularly for the feeding of European children.

Apropos of soya beans, it is pointed out that the Chinese use practically no dairy produce, yet they have succeeded by the use of this article of food in living on what is a well-balanced diet.

The writer quotes the work by Mackenzie WALLIS on the new proteid substances which he discovered in ground nuts; bread and biscuits can be made from this material which has a high degree of digestibility and is a very sound food, being rich in anti-beriberi vitamin.

A very extensive bibliography is appended.

PORTER (Annie). **On the Effects of Cold on the Vitality of Certain Cysticerci and Echinococci in Meat kept under Commercial Conditions of Freezing in Johannesburg.**—*Publications of the S. African Institute for Medical Research.* 1923. Feb. No. 16. 49 pp. [12 refs.]

It is impossible to abstract the technical details of this paper, but the conclusions, which are of very great importance to all Sanitary Officers everywhere in the East, are given *in extenso*.

"The present investigation has dealt with the effect of continued cold on the viability of the cysticerci of *Taenia solium*, *T. saginata* and *T. crassicolles*, and on the echinococcus of *Taenia echinococcus*, the flesh of infected hosts being frozen under the commercial conditions possible at an abattoir such as that at Johannesburg.

"Tests for viability of the various larval forms of the afore-mentioned tapeworms were based on the morphology, motility and staining reactions of the cysticerci or echinococci, and on their power to develop into adult tapeworms in experimental animals (dogs and kittens) in the cases of *Taenia crassicolles* and *T. echinococcus*. Animal experiments with *Taenia solium* and *T. saginata* failed, as has been the experience of other workers, and these adult tapeworms seem to be specific to man.

"Staining reactions proved to be the most satisfactory means of testing the viability of *Cysticercus bovis* and *C. cellulosae*. Methyl green slightly acidulated with acetic acid was the most satisfactory stain of those used. Dead cysticerci stain relatively deeply and rapidly compared with control living cysticerci from freshly killed beef or pork. Deepseated cysticerci should be used for staining tests.

"Cystercerci and echinococci frozen for short periods have retained their vitality as judged by staining reactions. The administration of meat containing hydatids of *T. echinococcus* frozen for 30, 43, 61 and 70 days to clean laboratory-bred dogs has resulted in infection with *Taenia echinococcus*. Similarly, freezing for a month was found experimentally not to have destroyed the vitality of *Cysticercus fasciolaris*, as adult *Taenia crassicolles* were obtained in clean laboratory animals after feeding on the frozen cysticerci. By analogy, freezing for short periods is not likely to kill *C. bovis* or *C. cellulosae*, and this is confirmed from consideration of the staining reactions and morphological condition of these cysticerci under similar conditions of experiment.

"Deepseated cysticerci remain alive after freezing when surface ones are killed, as judged by staining reactions and morphology. Cysticerci protected by fat are still living when unprotected ones have been killed by freezing. Motility tests for viability were found undependable and unsatisfactory.

"Physical degeneration in any form, lack of motility under the influence of warmth and rapid taking up of stains, as a total picture, are probably indicative of the dead condition of the bladderworms under investigation.

"Freezing at temperatures ranging from  $-5^{\circ}\text{C.}$  to  $-18^{\circ}\text{C.}$  for a period of about ten weeks appears to destroy the vitality of all the cysticerci in carcasses of beef and pork. For safety, a margin should be allowed on this period of freezing, and it is suggested that a period of at least twelve weeks' freezing of slightly infested beef or pork at a temperature of  $14^{\circ}\text{F.}$ , that is  $-10^{\circ}\text{C.}$ , should be undergone before the meat may be regarded as sterile, and the cysticerci as dead.

"In regard to the suitability of frozen measly meat for human consumption, the experimental evidence goes to show that if such meat be frozen for twelve weeks the contained cysticerci are unlikely to develop into tapeworms in the human digestive tract. Nevertheless, the nutritive value of the meat and its keeping properties are less satisfactory than those of normal frozen meat. Where heavy infestation of a carcase occurs, in my opinion, such a carcase should not be used for human food, even if frozen for twelve weeks. Where the bulk of the parasites is large, meat so infested cannot be considered either wholesome or nourishing. Total loss to the owners can be avoided by the consignment of such carcasses to the inedible-tallow works or the fertiliser plant, as is done in South America.

"Meat very slightly measled, so that the cysticerci detectable could be removed and the remainder issued almost certainly as normal, might profitably be frozen for twelve weeks and then be issued for consumption, preferably under declaration of its nature, instead of being condemned. As before mentioned, under pre-war conditions, the Freibank system of Germany dealt with the meat containing measles as follows:—The meat in question was never heavily measled. The measles were removed, the meat was frozen for three weeks, then cooked thoroughly by the Municipality and sold under declaration of its nature at reduced rates, under the name of 'spoiled meat.' Heavily infested carcasses were sent to the inedible tallow factories, and when as many products as possible had been extracted the remains were passed on to the fertiliser plant. A similar system holds at the present time at the great meat exporting centres in the Argentine. In the absence of such a system, it is obvious that more care is necessary in dealing with meat infested with measles, and much longer periods of freezing are necessary than have been used previously to ensure the death of the bladder worms."

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## CONSERVANCY.

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1924. Jan. 18. Vol. 65. No. 1670. p. 52.—**The Evolution of Sewage Disposal.**

"There is much interesting information to be gathered from a perusal of some of the various pamphlets, reports, and papers issued in the middle of the last century on the subject of sewerage and sewage disposal.

"It must be remembered that early in 1800 scarcely any water-closets existed, as Bramah had only quite recently invented his ingenious but cumbersome apparatus. All human excreta was deposited in either privies, middens, or night stools. There were a few cesspools or 'fosses' as they were then called, in some of the larger towns, but no drains or sewers as we now know them.

"Even so late as the year 1865, from a return given in a report of one of the numerous Government Commissions which were then being held to inquire into the question of sewage disposal, it appears that with regard to the large Continental towns or cities 'the use of privies is very general, water-closets being rare even in large towns, and the usual method of dealing with human excreta is to allow it to collect in pits . . . . For instance, in Berlin, with a population of about



600,000, there are said to be no fewer than 50,000 night stools in use.' In the United Kingdom things were a little better, as the introduction of water supplies under pressure had given a great impetus to the installation of water-closets in houses and the provision of systems of sewerage.

"But the question of the ultimate disposal of the sewage from the sewers was still a matter of dispute and inquiry. Copious reports were issued by commissions, congresses, scientific societies and eminent sanitary engineers.

"In October of the year 1866 a congress on the subject was held at Leamington, the then Lord Leigh was president, and the conference was attended by many of the leading sanitary engineers of the day.

"The conclusions arrived at are very interesting at the present date, as they utterly condemned the water carriage system of dealing with excreta. It was considered that 'the cause of failure in our sanitary arrangements, and the many evils which have arisen out of them, have been clearly proved to be owing to the unnatural admixture of human excreta with large quantities of water, and to the prevailing custom of employing water as the vehicle for their removal out of our houses,' and that in place of water we should resort 'to the natural agency of earth, which is as old as the Creation itself, and is comprised in the law of 'earth to earth,' and which law must again be strictly enforced.'

"It is almost pathetic to read these words of fifty-eight years ago in view of our present knowledge, but at the same time we should humbly confess that possibly in the year 1983 our present views as to the proper methods of dealing with human excreta and the purification of our sewage may be regarded in the same manner as we regard the views expressed about half a century ago.

"Fortunately the expressions of opinion of that important congress were not accepted as practical, and the water carriage system gradually became generally adopted.

"But the pressing problem of how to deal satisfactorily with sewage remained still unsettled. It would take many pages of this journal to describe or even enumerate the large number of processes that were patented and tried for many years in order to arrest the decomposition of water-carried sewage and to purify the effluent. Between the years 1865 and 1875 upwards of 400 patents dealing with the problem were granted. All the processes that were tried were costly to instal and expensive to carry on, and were all more or less failures; but some of the best of them were carried on for many years on the assumption that it was necessary to arrest decomposition. It was not till the light broke on our vision and it was found that decomposition was our friend and not our enemy that these more or less futile attempts were abandoned. What was known as the septic tank treatment changed our views on the subject and revolutionised the preceding attempts. Decomposition, or 'the act of separating the constituent elements of a compound body or substance' is the real law 'as old as the Creation itself,' and this system almost at once superseded the multitudinous chemical and other processes which had been found to be failures.

"Many alterations and improvements were from time to time effected in the methods employed to perfect the process which was introduced about thirty years ago, and is still satisfactorily working in hundreds of cases. More recently a further development has taken place by the introduction of what is known as the activated sludge process, which is

making rapid progress. It is practically on the same lines as the septic system, as aëration has always taken an important part in sewage purification. Oxygen appears to be not only a great life-giver but also a purifier, and possibly the future may reveal to our scientific investigators some further glimpses into Nature's forces which are no doubt available for our benefit if we could only discover them and harness them for our use."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1923. Nov. 23.  
Vol. 64. No. 1662. pp. 381-382.—**The Drying of Activated Sludge.**

"Experiments have been made at Sheffield in which the sludge from the bio-aëration plant have been regularly applied to prepared ash filters consisting of 18 in. to 24 in. of graded clinker, or cinders with good drainage, the top layer being fine ash about 4 in. thick. During the past twelve months this sludge has been regularly applied in 6-in. layers to the filters, and has been allowed to stand from eighteen to twenty-four hours, after which the cake has been removed by shovels. The filter has been raked over and allowed to dry for twenty-four hours and a further 6 in. of sludge applied. Other experiments of considerable interest have been made, namely, with sludge laid on a band of paper-maker's gauze travelling over a vacuum box, with the acid treatment used in America, also with centrifuges. It is found possible to effect considerable decrease in bulk by means of the centrifuge, but the product is only a semi-liquid mud. By the prolonged settlement of wet sludges a considerable separation of water has been effected; by applying flotation processes with air or other gases such as are used in the separation of mineral ores, rapid separation of large quantities of water can be obtained. Mr. Haworth concludes that the drying of sludge on suitably prepared ash or sand filters appears to be the most profitable and economical method at the present time. There can be no doubt from the very clear evidence given by Mr. Haworth that the de-watering of sludge ought no longer to be considered an obstacle to the adoption of the process. Mr. Haworth's paper and work are deserving of the very highest commendation."

WATSON (John D.). **Sludge Digestion.**—*Surveyor & Municipal & County Engineer.* 1923. Nov. 23. Vol. 64. No. 1662. pp. 383-384.

"The sludge is transferred from a given sedimentation tank into the selected digestion tanks (generally five or six in number) by the main set of pumps; simultaneously some of the ripest of the available sludge is pumped from a digestion tank into the same delivery main in the proportion of 1 to 4, thus inoculating at the earliest moment the fresh sludge with fermentative organisms.

"It was observed quite early that inoculating raw with ripe sludge had an excellent effect upon the speeding-up process. In addition, steam from one of the Lancashire boilers, when it is available, and in cold weather, is injected into the delivery main to encourage temperature conditions most favourable to fermentation.

"The average analysis of the sludge is as follows:—

	1915-18 inclusive.	1919-22 inclusive.
Water ... ..	92.5 per cent.	92.0 per cent.
Dry solid matter ... ..	7.5 per cent.	8.0 per cent.
Specific gravity—wet sludge ... ..		1.0256 per cent.
Specific gravity—dry solid matter ... ..		1.50 per cent.
and the average analysis of the dry solid matter is—		
Matter volatile at red heat ... ..		58.5 per cent.
Matter non-volatile ... ..		41.5 per cent.
Total nitrogen ... ..		2.71 per cent.

"The rotted sludge, or residuum of the fermentation process, is pumped direct to the drying beds, which consist of  $\frac{1}{2}$ -acre plots of engine ashes, the total area being about 60 acres. All the plots are underdrained with 4-in. agricultural pipes, laid in a herring-bone fashion toward a main leader which conveys the drainage to a well, whence it is pumped up to a percolation filter.

"Each drying bed is formed by earthen banks about 2 ft. high, and the sludge is deposited to a thickness of 18 in. ; it dries down to about 6 or 7 in.

"The time required for drying varies with the weather. In dry weather it quickly cracks and admits air, but in our climate it would be rash to assume that it is possible to dry more than two fillings per annum.

"The area is provided with a system of permanent 2 ft. gauge tramways laid to suit locomotive haulage, and provided with conveniently placed turnouts and crossings to allow temporary rails to be laid through the beds for the collection of dried sludge.

"When the sludge is removed from the drying beds it is delivered by light railway to the contractors for storage and treatment in their immense sheds, which stand on about 7 acres of ground. The sludge is broken up and spread in a thin layer on the floors of the sheds, which are so constructed that the wind can blow through them. The length of time it takes to dry depends upon the atmospheric conditions.

"When it is sufficiently dry it is collected and ground into a fine meal and screened so that all foreign substances are eliminated. The meal in this condition is then stored and makes an excellent base for a fertiliser. The finely-ground condition of the meal is one of the chief factors which influence its availability to the crop, as it is obvious that the finer the particles the more rapidly the agencies in the soil effect the necessary chemical and bacterial changes.

"Our contractors fortify it with sulphate of ammonia, bone phosphates and sulphate of potash. It is then bagged and despatched by rail for application to the land.

"The process of sludge treatment is put forward as a complete process in itself, just as the Imhoff tank process was put forward by the German engineer, but without in this case any suggestion that the effluent from the sedimentation tank could be discharged into a stream."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1924. Jan. 18.  
Vol. 65. No. 1670. p. 45.—**Economical Results [Activated Sludge] at Withington.**

"In a report contained in the appendix to the City of Manchester Rivers Department Annual Report, Dr. Ardern and Mr. William



Lockett show how they have managed to increase the effective capacity of the activated sludge plant at Withington by 25 per cent. without incurring a corresponding increase in the cost of operation. They have further shown that under proper control the process is so elastic as to render the treatment of large volumes of storm water a comparatively simple matter. These results have been obtained in consequence of an investigation made with respect to the conditions controlling the character and activity of the sludge, especially with regard to sudden and abnormal bulking of the sludge in circulation. Bulking generally results in the temporary loss of control of the activated sludge in circulation, settlement is protracted and the resultant effluent is adversely affected. Microscopical examination indicated that bulking was associated with protozoal and bacterial growth; it was then found that prolonged aëration of bulked sludge resulted in marked reduction of these growths. Subsequent investigations, however, established the fact that under suitable aëration conditions, the control of the process could be well maintained without reference to the higher organisms contained in the sludge. For each individual sewage there is a more or less definite minimum limit of air supply necessary for satisfactory operation of the process. It was proved that the total solids per hundred c.c. of sludge reach a maximum during periods of prolonged wet weather in the winter months, and a minimum in periods of prolonged drought, or when there has been any tendency to operate the plant at a rate of flow beyond its maximum effective capacity. With this information available it became possible to predict the effect, on the physical condition of the sludge, of the variation in the character of sewage treated; and the volume of sludge to be removed could be gauged with precision. Also, in conjunction with information yielded by the study of the dissolved oxygen content of the mixed liquor in the aëration chamber, it has been found possible to increase very materially the maximum rate of operation during periods of high dilution, and thus to deal with a volume greatly increased during wet weather, the air consumption on the basis of air consumed per gallon of sewage comparing to advantage with the results previously ascertained.

"It is estimated that the cost of treatment at Withington per million gallons, based upon a 60 per cent. efficiency air plant and electrical energy at 7d. per unit, including attendance and materials, is £2 5s. 3d. As a consequence of these investigations a large new installation was built out of revenue funds accumulated for the purpose of the renewal of the filters because it was seen that the outlay would be expended to much better purpose; and it is further anticipated that the consequent future reduction in the load on the filters will result in a large saving of annual expenditure, and that this sum will be considerably in excess of the probable cost of operation of the new plant. The effluent will be of better quality than before, and everything tends to show, after long and careful investigation, that the new process is more economical and efficient than any possible alternative carried out on the older lines."

**SHENTON (H. C. H.). Sanitary Engineering : a Review of Present-Day Practice.**—*Surveyor & Municipal & County Engineer*. 1923. Sept. 14. Vol. 64. No. 1652. pp. 187–190.

**America and Activated Sludge methods.**—

"The sludge at Houston was disposed of, with substantial success, by lagooning, and at Chicago there was land available on which lagoons

could be located, to which the sludge from activated sludge plant might be discharged by pumping through pipe lines several miles in length.

"A summary of operations of the MacLachlan process at Houston was then given. The plant consisted of a conditioning unit made up of a special rotary sulphur burner with pressure blower, which conducted sulphur dioxide fumes into a gassing tank, where the flow of raw sludge was impregnated and put into shape for a quick filtration. The conditioning unit was followed by two continuous sludge filters each having a filter drum 40 in. in diameter and 84 in. long. The system had been in operation about three months, during which time numerous minor mechanical refinements had been introduced, so that the machines were now operating twenty-four hours daily. Each machine turned out an average of 850 lb. of sludge cake per hour, the cake averaging 79.8 per cent. water and ranging from 77 to 81 per cent. The recovery of the solids on the filters was averaging 74 per cent., and the sludge averaged 99.5 water. The conditioning unit and two sludge filters were using a total of 9 h.p. and the sulphur requirement was averaging 40 lb. per hour to condition the sludge feed to both machines. The labour requirement was one man per shift. The continuous filters resembled those used at paper mills to remove pulp from waste water.

"At Milwaukee it was understood that the sludge would be acidified, heated to 160° Fahr. and filtered through a vacuum filter to produce 80 per cent. water content. This product would be dried to 10 per cent., screened and crushed. An output of 100 tons was expected daily of dried sludge containing 7 per cent. nitrogen, of which 70 per cent. was available as fertiliser. Unanimity of opinion had not been obtained as to the best arrangement of presses and driers. Data as to dewatering from one city should not be taken too literally for application elsewhere, on account of variations in the composition of sludge."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1923. Sept. 7. Vol. 64. No. 1651. p. 165.—**Hot Water Supply and Sludge.**

"One of the papers read at the recent congress of the Royal Sanitary Institute at Hull raised the question of the possibility of utilising the gas generated in sludge tanks for heating a public hot water supply. . . . There is no possible doubt that much gas is generated which could be used, and that this is absolutely wasted. Given the sludge, there is as much certainty of obtaining an explosive gas capable of doing work as there is in the case of an equivalent quantity of coal.

"This gas has been used at sewage works for engines and lighting. There are, however, difficulties which are not to be ignored. The production of gas varies with the temperature and with other conditions. In a hot climate the possibilities are much greater than in a cool climate. Mr. Watson, of Birmingham, has run a 25 h.p. engine with this gas, but he finds that with sludge at a temperature of 50° little gas is produced. He considers the optimum temperature 90°. Mr. Martin gives as a safe figure a daily yield of 1 cubic ft. of gas per head per day, but there is no doubt that the yield could be increased by adding simple substances like paper to the sewage. Another difficulty is due to the fact that this gas may be poisonous. It appears, however, that this view was not taken by the authorities at the Leper Hospital at Matunga (near Bombay), where the sewage was pumped, the buildings lighted and the patients' food cooked by means of the gas produced from

the sewage. Mr. Martin, in quoting this instance, clearly proves the possibility of his suggestion.

"Sludge digestion tanks are certainly a very important feature in modern sewage works, and it is from these tanks rather than from septic tanks that the gas would be obtained. Mr. Martin calculates that the money value of this gas would be considerable. For a town of 50,000 inhabitants its value would be about £3,500 per annum, for Birmingham £66,000, and for London £374,000 per annum. Mr. Martin shows that although temperature may affect the rate of gas production, there is no evidence that digestion is less complete at British temperatures, and thus the total evolution of gas will be the same in both cases. The only difference is that more storage room must be provided in this country than in the tropics. He argues that the gas produced from the sludge of a large community might be used to heat water in a group of smaller houses. Thus the gas from a population of 50,000 persons might heat water for 570 houses. The gas would cost nothing so far as its manufacture was concerned, the only expense would be storage and distribution."

HOTCHKISS (Margaret) & MURRAY (T. J.). **The Relative Prevalence of Bacteria in an Imhoff Tank.**—*Amer. Jl. Public Health.* 1923. July. Vol. 13. No. 7. pp. 562-567. With 3 charts in text.

This paper gives some interesting and valuable results on the various bacteria present in the Imhoff Septic Tank, but it is

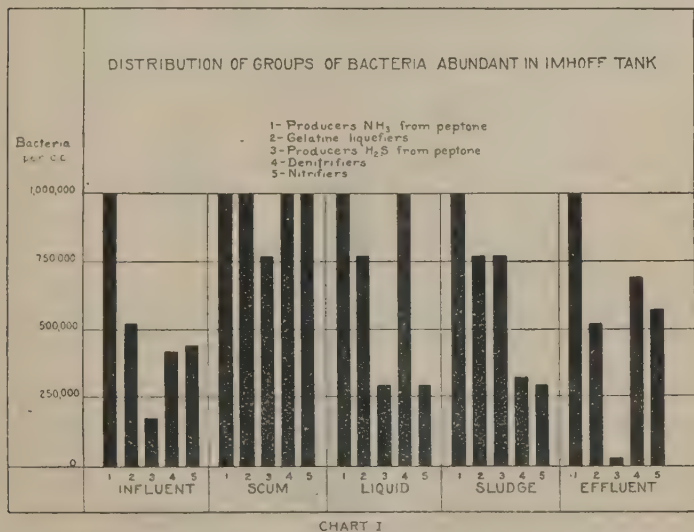


FIG. 14.—Shows that nitrifiers and denitrifiers are present in about the same numbers in the influent; but that with the exception of the scum, the denitrifiers tend to increase and the nitrifiers to decrease. Oxidation of ammonium salts to nitrite and nitrate occurs in all parts of the tank, but only in the scum is there an increase in the numbers of the organisms producing the change. The bacteria which utilize nitrate oxygen and reduce the nitrogen increase in numbers in all parts except the sludge.

[Reproduced from the *American Journal of Public Health.*]



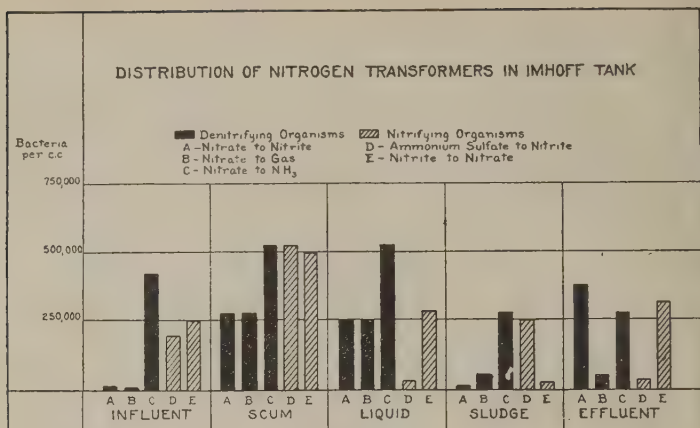


CHART II

FIG. 15.—Shows stages of denitrification and of nitrification.

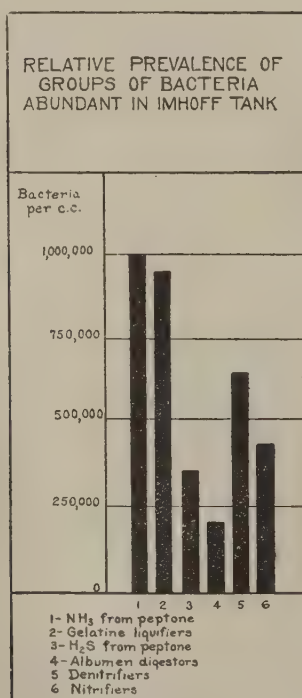


CHART III.

FIG. 16.—Relative prevalence of the various groups of bacteria in the Imhoff Tank.

[Reproduced from the *American Journal of Public Health*.]

too condensed to summarize. The bacteria found are classified as follows :

“ The bacteria through whose agency some of the enzymes are produced may be divided by their physiological activity into several groups. The bacteria which were present in high dilutions of the samples, and so were considered to be abundant in the tanks, may be divided into six groups. Of these groups of bacteria those concerned with protein digestion were : (1) the bacteria which were able to attack such a complex protein as coagulated egg albumen and produce soluble compounds, (2) those which attacked a less complex protein, such as gelatine, and caused liquefaction, (3) those which attacked a soluble protein, such as peptone, and decomposed it with the production of ammonia, (4) and those bacteria which also gave sulfides as a product of proteolysis.

“ The fifth and sixth groups are concerned with the transformation of nitrogen. There were found to be present in the tanks both those types of organisms classed as ‘denitrifiers’ and those termed ‘nitrifiers.’ The former group consists of the bacteria which reduce nitrate nitrogen to nitrite and to nitrogen gas or to ammonia. The second group are the bacteria which produce nitrite nitrogen from ammonium salts and the co-operating bacteria which change the nitrite to the nitrate form.

“ In addition to these six dominant groups there have been found four groups which consist of bacteria active in the Imhoff tank but seemingly present in smaller numbers. These bacteria may be listed as : (1) the bacteria producing sulfate and free sulfur (from thiosulfate), (2) the bacteria producing hydrogen sulfide from sulfates, (3) the cellulose digesting bacteria, (4) the bacteria which split fats.”

Probably the best method of epitomizing the paper is to reproduce the charts ; these give the results in graphic form.

HAUSMAN (Leon Augustus). **Preliminary Studies of the Fauna of the Imhoff Tank.**—*Amer. Jl. Public Health.* 1923. Aug. Vol. 13. No. 8. pp. 656-658. With 4 figs. [1 ref.]

The writer has made a careful study of the various protozoa and other minute forms of animal life in various parts of the Imhoff Tank, and gives here the preliminary results of his observations. The object of the enquiry is to obtain answers to the following questions :

(1) The organisms present ; (2) their distribution ; (3) their effect upon the material where they occur ; (4) whether this effect is of such a character as to warrant attempts to modify their numbers ; and (5) if so, and if it be worth the cost, how this can be done ; (6) or whether the organisms present are an indifferent element in the operation of the tank, merely rising and falling in numbers in correspondence with the food supply ?

The first two questions are practically answered and the results are given in graphic form.

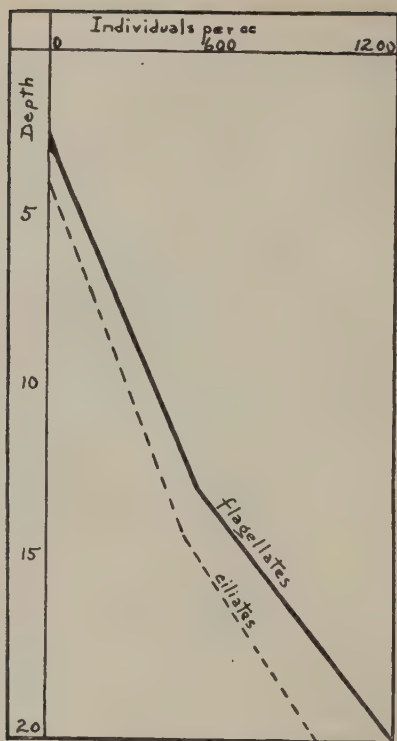


FIG. 17.—Depth succession of the dominant protozoa of the Imhoff Tank in numbers of individuals per cc.

[Reproduced from the *American Journal of Public Health*.]

WILLE (W. A.). **De septic tanks van Soerabaja en Semarang.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1923. Vol. 63. No. 4. pp. 663–669. With 5 text figures.

Wille describes two common mistakes made at Sourabaya and Semarang in the construction of septic tanks.

1st. The depth of the tank is often not sufficient to allow for a liquid layer between the sediment and the floating faeces. This results in choking of the outlet. The depth of the tank should be 125–290 cm. reckoned from the surface of the contents.

2nd. Wille asserts that a separation screen reaching down from the roof of the tank near the inlet confines the activities of the tank to the part in front of the screen. This last assertion appears subject to considerable doubt\*.

[This statement is only correct if the partition is successful in keeping all the solid faeces in the first chamber. If solid matter passes into the body of the Tank it naturally has no influence in this respect.—W. W. C.]

\* Summarized by Dr. W. J. BAIS.



FULLER (George W.). **Observations on Refuse Disposal in Europe.**—  
*Surveyor & Municipal & County Engineer.* 1923. Oct. 26.  
 Vol. 64. No. 1658. pp. 303-304. [1 ref.]

#### British Refuse.—

"British refuse, as in all countries, varies considerably, depending chiefly upon the different uses of coal. A representative analysis, as estimated by Mr. DAWES, is: For ash and fine dust, 45 per cent.; cinders of all sizes, 35-40 per cent.; vegetable matter, 5-10 per cent.; paper and light debris, 4 per cent.; metals, 1-15 per cent.; bone, 3 per cent.; and glass, brick and heavy debris, 12 per cent. The British collect mixed refuse and do not deal separately with organic matter, except as it comes direct from markets. They do not use the American expression of 'garbage' as applied to kitchen refuse other than from ranges, but speak of vegetable matter, or putrescible matter, or organic matter . . . . .

#### "Six British Disposal Methods.

"There are six methods in quite general use for the disposal of the mixed refuse of Great Britain:—

"1. Tipping or dumping on land where the management is inadequate for securing freedom uniformly from flies, rats, wind-blown papers or objectional smells, especially from fires which, on account of the large quantity of combustible material in the refuse, sometimes burn for months, in spite of efforts to extinguish them.

"2. Tipping or dumping on land, in conformity with precautions set forth by the Ministry of Health in its Circular of July 26th, 1922.

"3. Dumping at sea where the barging distance is reasonably short to locations where suitable tides and currents convey the material seaward and not landward. It is understood that this is practised only at Southampton and a few northerly cities on the East Coast.

"4. Burning in high temperature incinerators which the British call 'destructors,' notwithstanding that the burnt refuse leaves perhaps half of its bulk as clinker. In some, but not all, places this may be readily disposed of after crushing and screening for use in road building or for making concrete, or in some places for brickmaking. Electric current generated at destructors now finds a market through charging the batteries of motor vehicles used in collecting the refuse.

"5. Separation from the refuse of the fine dust and ashes by means of revolving screens, and also of the coarser debris, thus leaving the cinders and vegetable matter, which are incinerated. This arrangement will be carried out at the new Brook Vale destructor, now approaching completion, at Birmingham.

"6. Crushing of the mixed refuse, after freeing it of coarse debris, and utilising the pulverised product as a fertiliser for clay or loam lands. This product is also well suited for filling low lands. The fine material screened from cinders in Method 5 is similarly handled, while in Scotland much refuse is sent to farmers with little or no use of mechanical appliances for its preparation . . . . .

#### "Birmingham's New Plant.

"At the new 200-ton Brook Vale destructor at Birmingham, Mr. JACKSON will first remove by screening the ash and dust which form about 40 per cent. of the total refuse. This he will dispose of to farmers whom he expects to pay several shillings per ton . . . . .

"The refuse is tipped into one of three 10 ton concrete hoppers, with sides having steep slopes, and at the bottom is a moving metal belt, like a stoker grate, for discharging on to a revolving screen. It is the

intention to have not more than ten shovelsful at a time on an inclined screen, say, 4 ft. in diameter and 10 ft. long, with  $\frac{3}{8}$  in. openings. The removed ash and dust goes to motor trucks or canal barges, leaving the cinder which at some places, has 10,000 B.T.U. per lb. At the lower end of each screen are several magnets for removing metals from the screened refuse before its discharge on to a moving sorting belt for hand removal of glass, bones, and heavy debris. The top of this belt passes under a hood where it is expected to remove paper by suction. The cells will be hand stoked from the top with material discharged from the sorting belt or from a tip which may be used if it is not desired to screen some portions of the refuse. Clinker will be removed from the rear of the cells."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1923. Sept. 28.  
Vol. 64. No. 1654. p. 242. With 2 text figs.—**The S.D. Freighter Dust Cart.**

The two pictures published below give some idea of an extremely interesting and satisfactory rubbish lorry. It is specially designed for



FIG. 18.—Borough of Deptford's S.D. freighter tip wagon.

[Reproduced from *The Surveyor & Municipal & County Engineer*.]

this purpose and can be tipped up. A good point is that bins can be emptied into the receptacle without the use of a ladder. In Deptford, where this one was used, 13 to 15 hundred tons of material was handled per month. It is driven by a petrol engine and gives, loaded, 15 miles to a gallon of petrol. Its turning radius is 10 ft. 6 ins. on the outside wheels of the chassis, and outside the body 13 ft. 6 ins., so that it is admirably suited for narrow streets and conservancy lanes.

There should be a good market for vehicles of this kind in the large cities in the East.

HOWARD-JONES (J.). **The Collection and Disposal of Refuse from Ships in Docks and Harbours.**—*Jl. Roy. Sanitary Institute*. 1924. Jan. Vol. 44. No. 8. pp. 289-291.

The writer points out that in the matter of removal of refuse from ships in harbours, the arrangements still leave much to be desired. The sailor is in the habit of throwing everything unwanted overboard and does not care very much what he does with it when in port. The writer suggests that the food waste should be sent ashore as being of considerable value for feeding pigs. He describes the various method of removal such as by carts and by hoppers. He considers that arrangements for this very important branch of conservancy should be greatly improved by all harbour authorities.

JOLLY (G. G.). **An Automatic Fly Proof Latrine Seat.**—*Indian Med. Gaz.* 1923. Dec. Vol. 58. No. 12. pp. 575-578. With 5 figs.

The writer has had a very wide experience of fly-proof latrines and anti-fly measures generally; one of the results of this is the ingenious invention of which figures are here reproduced, designed as an improvement on Major SCROGGIE's pattern (see *Tropical Diseases Bulletin*. 1920. Vol. 15. pp. 370-371). The important points are as follows:

"1. The shutters, being arranged to slide horizontally under the right and left halves of the top, are never in such a position that they can be fouled, since they completely disappear from sight as soon as the individual steps on the seat, and remain thus until he steps off again.

"2. The arrangement of the oval pan receptacle is such that its top edge comes close up to the under surface of the shutters, so that there is no possibility of excreta going anywhere than into it. The pan is ordinarily designed to take both faeces and urine, but it can be constructed in two sections so that they may be separated.

"3. In the portable pattern, entirely constructed of iron and steel, the weight of the whole seat is approximately 40 lbs., and handles are provided on either side to admit of its being readily moved from place to place.

"4. In the fixed pattern the top is constructed so that it can be lifted clear of the cement base, bringing with it the whole of the working parts, a procedure which facilitates repair and renewals.

"5. The working parts are simple, and so designed that they can be readily replaced or renewed by an ordinary blacksmith.

"6. The only attention which the seat requires beyond the periodical removal of the pan for emptying and cleaning, is an occasional application of cart grease to the working parts."



Illustrating JOLLY, G. G.]

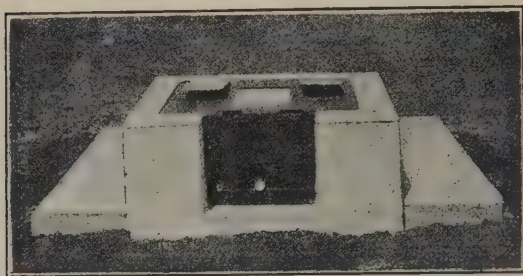


FIG. 19.—Front view, closed.

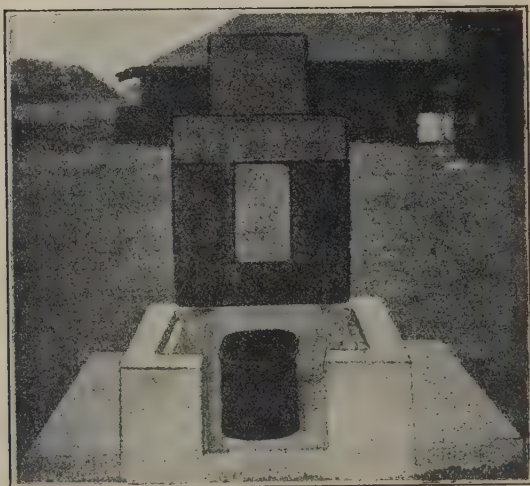


FIG. 20.—Front view, top raised.

Automatic fly-proof latrine seat.

[Reproduced from the *Indian Medical Gazette*.]

Illustrating JOLLY, G. G.]

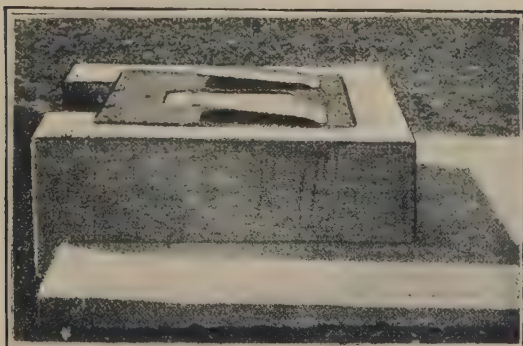


FIG. 21.—Side view, closed.



FIG. 22.—Front view, in use.

Automatic fly-proof latrine seat.

[Reproduced from the *Indian Medical Gazette*.]

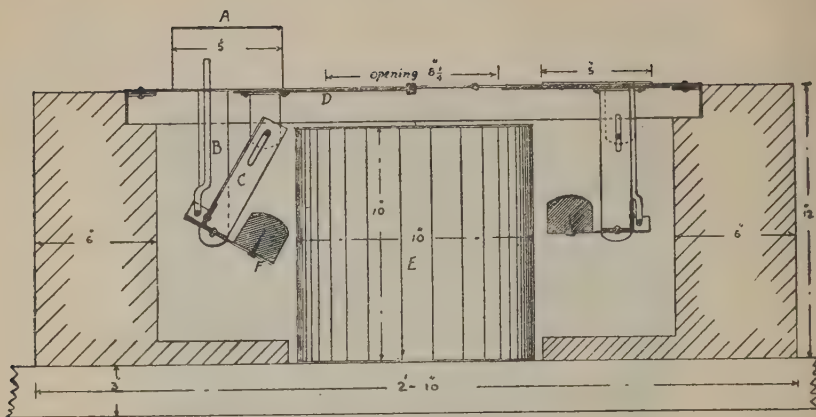


FIG. 23.—Cross Section of automatic fly-proof latrine seat. Foot plate A presses down rod B. Crank C then pulls shutter D and exposes receptacle E. Return action is made by weight F when foot is taken off A.

[Reproduced from the *Indian Medical Gazette*.]

### SMALLPOX VACCINATION.

GRUBBS (S. B.). **Vaccination Technique and Certification.** An Experiment in making Vaccination an Insurance against Delay as well as a Protection against Disease.—*Public Health Rep.* 1923. Sept. 21. Vol. 38. No. 38. pp. 2201-2206.

The writer gives an account of the lines on which smallpox vaccination is carried out in the New York quarantine stations. He points out that "with standard technique and proper virus, it is possible with this reaction to read the degree of immunity to smallpox possessed by the individual vaccinated . . . . The local disturbance or reaction following vaccination may appear within a few hours or not for several days. In general terms, the time of its appearance measures the person's resistance to smallpox, *i.e.* the earlier the reaction the greater the immunity; the later the reaction the less the immunity. The early reactions are, as a rule, slight, and the later reactions are more severe. Thus, persons previously unvaccinated will usually show no disturbances for three days or even longer, but the reaction will then go to a successful take. For purposes of record, three degrees of reaction are recognized; namely, immune reaction, vaccinoid, and successful vaccination; and further sub-divisions, especially of the immune reaction, may be recorded, if desired, by a system of plus marks. No hard and fast line can be drawn, however, although we usually say that an immune reaction must appear before 48 hours."

Certificates are granted the immune in the form of cards, a sample of which is given, and it is hoped that this will be recognized throughout the whole of the United States.



"We are confident that whenever such contacts show an immune reaction within 48 hours (at least two plus) they will not contract the disease and, therefore, may be released. If the reaction occurs after 48 hours, however, it shows the immunity is not complete and that smallpox may develop, probably in a mild form but dangerous to others. These persons must be held 10 days after vaccination. Full 14 days are not required, as, at the end of 10 days, after vaccination giving a reaction, there will be sufficient immunity from the vaccination just done to prevent the development of smallpox."

A description of the method used is as follows.—The skin is sterilized in the ordinary way and three scratches  $\frac{3}{4}$  in. long and an inch apart are made on the arm with a sterile needle. When the "drill method" is used three small holes two millimetres in width and an inch apart are substituted for the scratches. The standard virus is rubbed into the two outer lines with a sterile tooth pick. The advantage of this is that you have a control incision which is useful in ascertaining the amount of reaction. The immune reaction is described as follows.

"There is redness and swelling along the lines of incision which has received the vaccine as compared with the control. Vesicles rarely occur. The reactions may be divided into four grades as indicated by "+", "+ +", "+ + +", and "+ + + +".

"+" Reaction—One in which there is slightly more swelling and redness in the vaccination scratch than in the control.

"++" Reaction—A definite reaction as compared with control.

"+++" Reaction—Marked reaction as compared with control.

"++++" Reaction—Very well marked reaction as compared with control.

"Reactions which do not make their first appearance within 48 hours will not be classed as immune reactions for the purpose of releasing persons from quarantine detention or for other purposes, nor will a "+" reaction be accepted either for release or issue of certificate. Reactions must be definite . . . ."

"*Vaccinoid* (accelerated and modified vaccination).—Appears after 48 hours. The papule occurs after two but frequently before 5 days have elapsed. The reaction is less severe and takes less time to run its course than a typical take. Vesicles frequent; pustules not always present.

"Successful vaccination.—(Typical Jennerian vaccinia).—No reaction shown for three to five days. Vesiculation from fifth to seventh day with areola present; purulent, with well-marked areola about the eighth day."

LEAKE (J. P.). *The Immunity following Smallpox Vaccination.*—*Milit. Surgeon.* 1923. Oct. Vol. 53. No. 4. pp. 328-336. [12 refs.]

This paper covers much the same ground as the one preceding. The author describes in detail the manifestations of vaccinia in the unvaccinated and in the person with a considerable amount of immunity. He prefers the small cutting drill 2 mm. in width to the needle and recommends that control sites not inoculated with lymph should be made when dealing with the slight reactions of high immunity.

He goes on to quote some figures of GINS of Berlin, who makes use of the "green" or unsterilized virus, and points out that although

re-vaccination may be classed as "unsuccessful" it increases the resistance of the patient. He points out also that when immediate danger of smallpox is present and high immunity is required quickly it is better to make a large number of small points than one or two large areas of scarification. These are more liable to septic infection and do not heal so quickly. He considers that vaccination, like oil in a good machine, should be applied little but often. The writer describes the various methods of storing vaccine lymph at low temperature.

It is well known that immunity to naturally acquired smallpox is generally higher than immunity to vaccination. In support of this he quotes an outbreak in a Burmese village. The population was about 1,500, of whom 144 had been successfully vaccinated within the preceding two years; 123 of the latter were inoculated, by an "inoculator," with smallpox during the epidemic without result. None of the other 21 vaccinated persons suffered from smallpox.

The writer also points out a fact well known to medical officers in the Tropics that the immunity which would be quite sufficient to protect an individual against chance exposure in a well-vaccinated community is inadequate in a poorly vaccinated place where the exposure may be intense and continual. Thus vaccinated persons have been known to contract smallpox and die from the haemorrhagic form.

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## CHILD WELFARE.

**BRAZIL. Departamento da Crença no Brasil. Rapida noticia sobre o Instituto de Protecção e Assistencia á Infancia do Rio de Janeiro. Seus serviços prestados ao paiz.** [Child Welfare in Brazil].—1923. (Boletim de Julho). 13 pp.

The work which has been undertaken by the Institute for Child Welfare (O Instituto de Protecção e Assistencia á Infancia) since coming into existence in July 1914 is very extensive. Over 100,000 poor families, comprising more than 410,000 individuals, have received assistance. In 1904 the Federal Government contributed 6,000 dollars, which was subsequently increased to 68,000 dollars. In 1906 the Municipal authorities gave another 6,000 and now contribute 36,000 dollars annually.

The activities of the Institute are many and there are sections dealing with every branch of the subject including even playgrounds and schools. At the Dispensaries, besides the usual medical and surgical treatment, there are available massage, electrotherapy, heliotherapy, and so forth. Arrangements are made for vaccination and re-vaccination, for distribution of food and clothing to the indigent and for the supply of suitable nurses. No statements as to the results of the working of the individual sections, nor as to the influence on the infantile mortality rate are given.

The Institute originally limited its activities to Rio de Janeiro, but now has branches in 17 districts of Brazil.\*

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\* Summarized by Dr. H. Harold Scott.

VARIOT (G.). **Les gouttes de lait dans les pays chauds. Utilisation de laits condensés sucrés.**—*Rev. Prat. Malad. des Pays Chauds.* Paris. 1923. Aug.-Sept. 2nd Year. Vol. 3. pp. 34-41. [2 refs.]

The writer gives a very interesting account of the method of administering child welfare depots in the French Colonies. He inspected one of the best established of these in Algeria and Tunis. They are now established in Casablanca, Rabat, Marrakech and Fez, in Dakar in W. Africa, Tonkin in E. Indies and in Madagascar.

In many parts of the tropics there are practically no cows ; in others the milk obtainable is of poor quality and scarce. The author has had considerable experience of ordinary sugared condensed milk, particularly the Gallia brand ; this is made in France, is not heated above 108° C. and is packed in sterile bottles and carefully corked. After 5 or 6 months it produces slight scorbutic effects ; consequently orange juice must be added to the diet. The drawback is the fragility of the bottles, which require very careful packing in properly prepared crates such as are used for bottles of wine.

Recently it has been found that the ordinary condensed milk with about 10 per cent. of saccharose added to it, provided it is evaporated down at a temperature of 60° C. only and packed in tins, is actually more satisfactory than the bottled product. The advantages of the tin over the bottle for export work are obvious. The 10 per cent. of sugar added is absorbed by the infant and apparently does not produce any ill results.

After very long experience of the use of this kind of milk the writer considers it to be of very great help in reducing infant mortality amongst children that cannot be fed at the breast.

WORLD'S HEALTH. Paris. 1923. Aug. Vol. 4. No. 8. pp. 20-23.  
With 2 figs.—**Sidelights on Child Welfare in India.**

This is an interesting popular account of the various difficulties met with by nurses and medical officers in charge of maternity and child welfare centres in India,—difficulties well known to our readers.

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## INDUSTRIAL HYGIENE.

COMMONWEALTH OF AUSTRALIA. Department of Health. Service Publication No. 26. 1923. 14 pp. With 1 plate.—**Hygienic Aspects of Factories and Shops Acts.**

This is a constructive criticism of the Factory and Shops Acts of Australia. It deals with all aspects of the Acts, such as accidents, inspection, employment of children, young persons and women, factory hours, hygienic conditions (ventilation, dangerous dusts, illumination, etc.) and general sanitation. Among items of general interest outside Australia there is a drawing of the ideal working chair for factories from a model devised by a committee of surgeons in Boston ; it is made in 4 sizes, 17, 18, 19 and 20 ins.



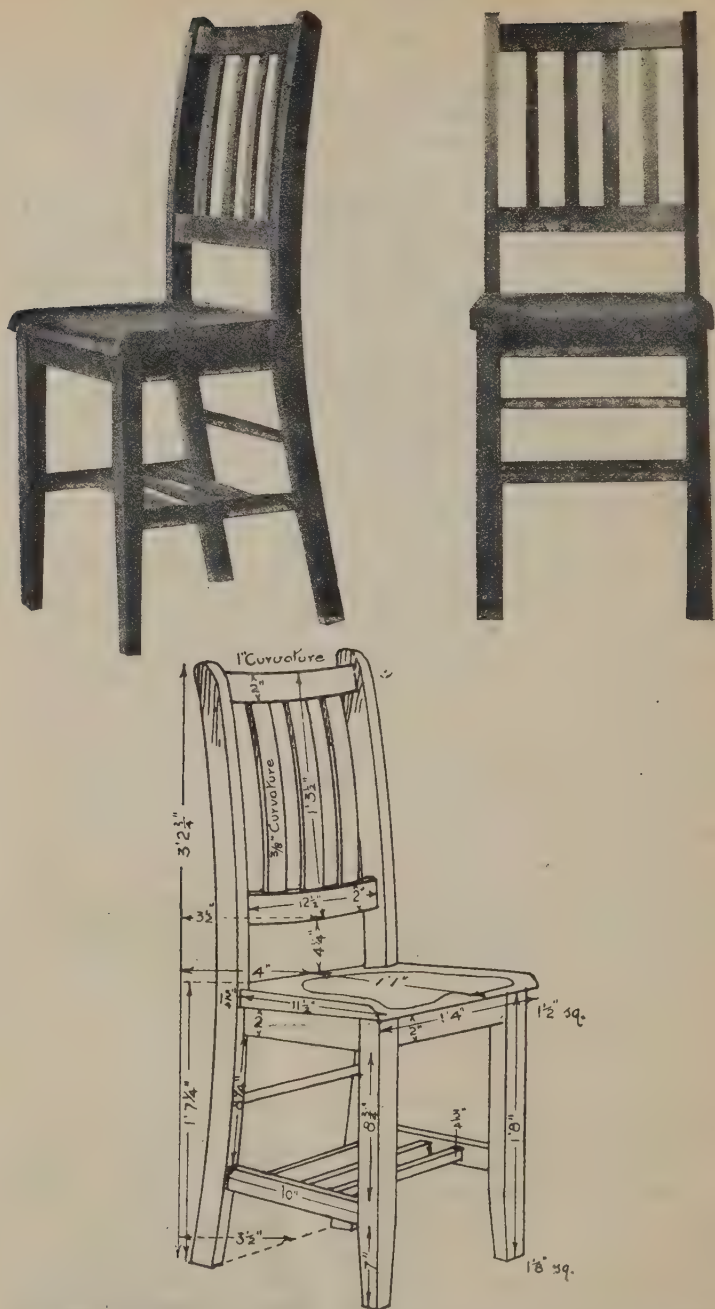


FIG. 24.—Illustration of a work chair, specimens of which were made for the Commonwealth Department of Health. The chair is made on the lines of the model chair devised by a committee of which Dr. J. E. Goldthwait, an orthopaedic surgeon of Boston, was chairman, and described in the *Journal of Industrial Hygiene* for September, 1921.

[Reproduced from *Commonwealth of Australia. Dept. of Health. Service Publication No. 26.*]

## REPORTS AND VITAL STATISTICS.

UGANDA PROTECTORATE. **Annual Medical and Sanitary Report for the Year ended December 31st, 1922.** [REFORD (J. Hope). Acting Principal Medical Officer.]—71 pp. 1923. Entebbe; Government Printer.

Birth rate 23·5 per thousand.

Death rate 20·8 per thousand.

Still-birth rate is high, namely, 12·79 per cent. of total births.

Considerable reduction in plague, smallpox and cerebro-spinal disease is reported from townships. 6 out of 7 cases of plague were treated with intravenous injections of salvarsan and recovered. Tick fever is very prevalent in the Western Province. Leprosy appears to be on the increase.

GAMBIA. **The Annual Medical and Sanitary Report for the Year 1922.** [ALLAN (K. V.), Senior Medical Officer].—39 pp. With 6 charts. London: Crown Agents for the Colonies, 4, Millbank, S.W.1. [Price 5s.]

Causes of infant mortality.—

- (1) Tetanus 26 per cent. of deaths.
- (2) Exhaustion from diarrhoea due to fly infection of food.
- (3) Fatal convulsions, very likely due to malaria.
- (4) Poor housing on damp sites in neglected parts of the town.
- (5) Illegitimacy.

CULLEN (J. P.). **Medical and Sanitary Work with the Burma Corporation.**—*Lancet*. 1923. Dec. 29. pp. 1426–1427.

This article is a review of the report of the Chief Medical Officer of the Burma Corporation, which operates in the North Shan state of Burma, about 600 miles north of Rangoon, with headquarters at Namtu at an altitude of 750 ft. The second centre, Bawdwin, is at a greater altitude. The Corporation is responsible for the medical care of a population of about 20,000, including Europeans and natives of all descriptions.

The general hygiene arrangements are good. The bungalows are made of wood and are properly screened against mosquitoes, electric light and water are laid on, and a water-borne system of sewage provided, with a small septic tank. The native accommodation consists of wood or mat houses with the ordinary pail system of conservancy. There is a large hospital and also an infectious diseases section.

Regarding enteric fever as a satisfactory index of the sanitation, it may be stated the neither enteric or cholera has appeared. A few cases of plague have occurred, but none of smallpox during the last three years.

There were in 1922 more than 17,000 cases of malaria in the hospital and dispensary, with 100 deaths, a mortality of about 15 per cent. Amongst 22 European cases no deaths occurred. A case of blackwater fever was noted in a native. A few cases of relapsing fever occurred, mostly amongst Chinese from Yunnan, with one death. An outbreak of beriberi with 19 deaths was caused by a few Chinese labourers arranging to mess with another Chinaman who fed them entirely on polished rice. There were no cases of miners' phthisis in the mines.

There is little or no hookworm disease, only 2 cases being discovered in the course of 1922. A certain amount of lead poisoning occurred amongst the smelters, due to the insufficient ventilation in the neighbourhood of the furnaces; this has now been remedied. The general crude death rate of 20,000 population is estimated at 17·5, malaria at 5 per thousand, and dysentery 75 per thousand.

**STRAITS SETTLEMENTS. Annual Report on the Medical Department for the Year 1922.** [HOOPS (A. L.), Principal Civil Medical Officer.]—96 pp. 1923. Singapore: Govt. Printing Office.

Some interesting figures from the hospital, Tan Tock Seng, Singapore, are quoted below.

<i>Malaria.</i>					<i>Cases treated.</i>	<i>Deaths.</i>
Benign Tertian	...	...	...	...	286	9
Malignant Tertian...	...	...	...	...	725	102
Quartan	...	...	...	...	172	5
Mixed	...	...	...	...	71	3
Chronic	...	...	...	...	402	43
Unclassified	...	...	...	...	164	6
Total					1,820	168

<i>Dysentery.</i>						
Amoebic	...	...	...	...	282	178
Bacillary	...	...	...	...	157	117
Unclassified	...	...	...	...	88	8

<i>* Helminthiasis</i>					<i>Cases.</i>	
Ankylostoma ova	...	...	...	...	...	454
Ankylostoma ova + Roundworm	...	...	...	...	...	110
Ankylostoma ova + Whipworm	...	...	...	...	...	98
Round worm only	...	...	...	...	...	252
Ankylostoma ova + Roundworm and Whipworm	...	...	...	...	...	66
Roundworm and Whipworm	...	...	...	...	...	112
Whipworm only	...	...	...	...	...	278
Negative	...	...	...	...	...	2,168
Total						3,538

\*Stools of every patient examined.

**BOMBAY. Fifty-ninth Annual Report of the Director of Public Health for the Government of Bombay, 1922, with Appendices, including the Annual Report of the Sanitary Board, Bombay Presidency, and the Annual Reports of the Health Officers of the Ports of Bombay, Karachi, and Aden.** [MELHUISE (H.), Acting Director of Public Health.]—pp. ii + 40 + 57. With 9 charts. 1923. Bombay: Govt. Central Press. [Price Re. 1 As. 5.]

Charts showing the monthly incidence of deaths from plague, cholera and smallpox in the Bombay Presidency during 1922, compared with the monthly incidence in 1921 and with the decennial means for the period 1911-1920 are reproduced (Fig. 25).



3

## MONTHLY INCIDENCE OF DEATHS FROM EPIDEMIC DISEASES.

1922 —●—, 1921 —○—, 1911-20 mean: - - - -

Semi-Log: Scales = deaths in thousands.

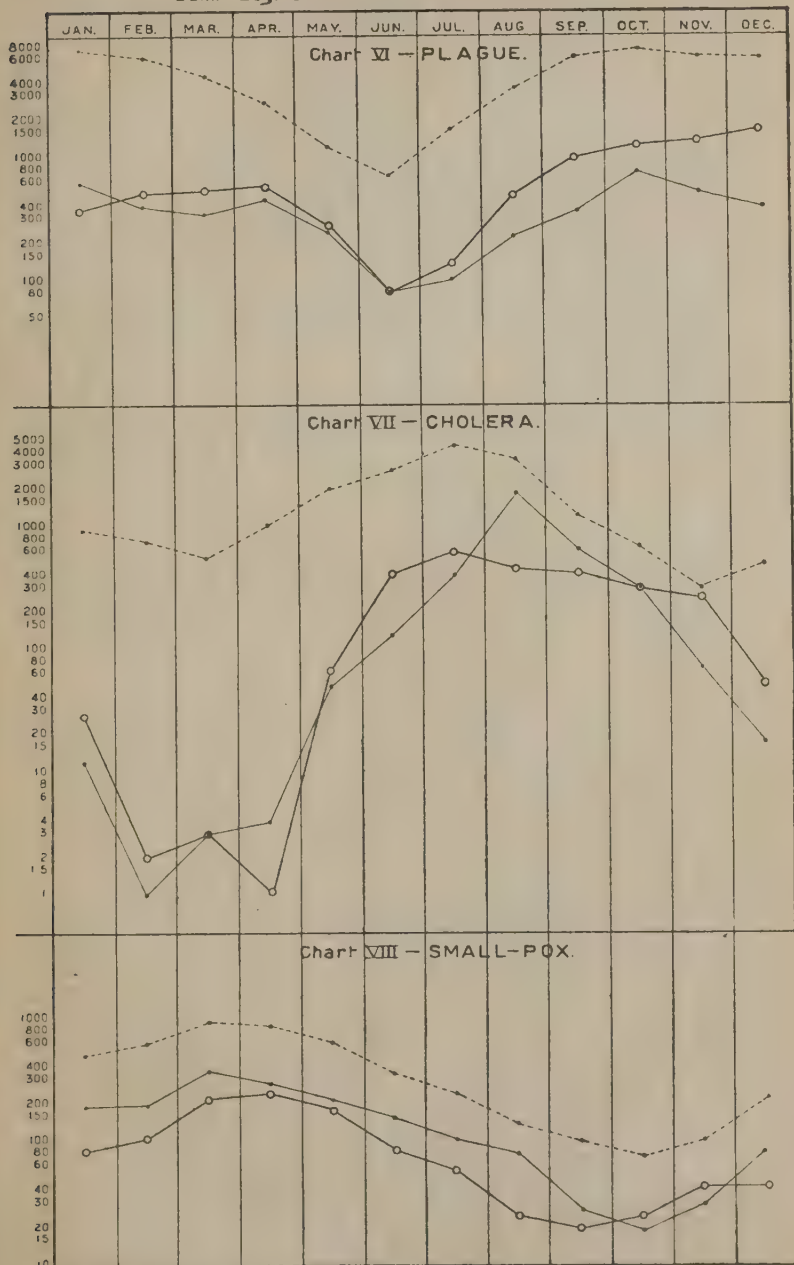


FIG. 25.—Monthly incidence of deaths from plague, cholera and smallpox in the Bombay Presidency in 1922 and earlier years.

[Reproduced from the 59th Annual Report of the Director of Public Health for the Government of Bombay, 1922.]

TIETZE (S.). **Sanitary Progress in the Philippine Islands during 1922.**—*Monthly Bull. Philippine Health Service.* 1923. Jan. Vol. 3. No. 1. pp. 3-19.

"Substantial decrements in the general mortality and in infant mortality rates constituted the salient gains of the year. The work in leprosy investigation has been expanded by more liberal appropriations and the detailing of expert technical personnel at Culion and San Lazaro Hospital; the vaccination campaigns for the eradication of smallpox, cholera, and typhoid fever have been conducted and continued in an intensive and systematic manner; and with the co-operation of the Rockefeller Foundation, malaria and hookworm surveys were effected."

NORTHERN TERRITORY OF AUSTRALIA. **Report on the Health Department for Year ending 30th June, 1921.** [JONES (H. Leighton), Chief Health Officer.]—*Report of Administrator for the Year ended 30th June, 1921.* pp. 27-32.

This report deals with a very small population, namely, 3,572, 2,478 being Europeans and 1,094 coloured races. This gives some idea of the very sparse population of the Northern Territory of Australia.

During the year there were no cases of enteric and no influenza. There was a mild epidemic of dengue, three cases of diphtheria and some malignant malaria in the latter part of the year.

There are about 13 lepers in the Leper Asylum.

The M.O. in charge considers the arrangements are not satisfactory as regards water supply, and makes recommendations accordingly. Of ankylostomiasis there is very little. Amongst so scattered a population as this anti-malarial measures largely consist of adequate treatment of the infected people. Measures taken in the town of Darwin follow the usual lines.

The following description of the Chinatown in Darwin is given.

"1. All the coloured people now housed in the Police paddock, together with those consumptive, and others who were repatriated to China at the expense of the Government, were located in the most congested parts of Chinatown, Darwin, as many as 32 families being camped on one half-acre. See Dr. Holmes photographs, Annual report, 1913.

"2. Infectious disease was rife amongst them.

"3. The water supplies from shallow wells were so polluted that many wells had to be closed and kept closed for a considerable time.

"4. A very high infantile death rate.

"Under new conditions in the Police paddock:—

"1. The village is situated nearly two miles from the town of Darwin proper.

"2. Fifty-six houses and camps on 56  $\frac{1}{4}$ -acre allotments.

"3. Three houses on three  $\frac{1}{2}$ -acre allotments.

"4. No infantile death rate.

"5. Good safe water supply from a sub-artesian bore, the expense of which was borne by the Government.

"6. The much improved condition of the coloured children.

"7. The fact that in any outbreak of infectious disease the coloured people can be confined to the Police paddock."

Crude European death rate, 11.5 per thousand.

Coloured death rate 24.6 per thousand.

European birth rate 10.08 per thousand.

Coloured birth rate 22.8 per thousand.

NEW ZEALAND. Department of Health. **Report of the Director-General of Health, New Zealand, for the Year ended 31st March, 1923.** [VALENTINE (T. H. A.) Director-General of Health.]—51 pp. With 4 graphs. 1923. Wellington: By Authority: W. A. G. Skinner, Government Printer.

Although by no stretch of imagination can the country of New Zealand be said to be the home of tropical disease, the annual report of the Department of Health contains some very interesting matter.

The mean population for 1922 was 1,251,895 (exclusive of Maoris), an increase of 27,994 over the previous year. The Maori population of the previous year was 52,751.

Birth rate 23·17 per 1,000. Crude death rate, 8·77 per 1,000 of mean population; standardised death rate, 10·70. Infant mortality in 1922 was 41·9 per 1,000 births, the lowest rate on record.

*Death rates of Notifiable diseases in 1922.* Scarlet fever, 0·08 per 10,000 of the population, has declined very rapidly since 1918. Diphtheria, 0·62 per 10,000 of the population, has also steadily decreased. Enteric fever, 0·54 per 10,000 of the population, shows a considerable increase owing to a water borne epidemic in Auckland. Tuberculosis, 6·56 per 10,000 of the population; of the total of 821 deaths 626 were assigned to pulmonary tuberculosis. Puerperal septicaemia, 1·79 per 1,000 births; the notifications have steadily increased during the last 5 years, but this is held to be attributable to more general observance of the law relating to notification, though it is admitted "that New Zealand occupies an unfavourable position as regards this disease in comparison with other countries." Influenza, a low incidence and a general mild type prevailed (23 deaths).

An interesting account of a water borne outbreak of enteric fever is recorded. It occurred in Mount Albert, a suburb of Auckland, also in the Avondale Asylum, which is in the same water supply area.

The water comes from a spring and is tapped by a well which passes through beds of very porous volcanic scoriae; it is pumped into reservoirs, and originally was extremely pure bacteriologically and chemically. During the last 12 years about a thousand houses have been built within what is probably the catchment area of the spring, and the sewage of some of them passes into the extremely porous soil. Early in 1921 the water, though still chemically quite pure, gave (on agar at 37°C.) 24 colonies of *Bacillus coli* in 5 cc. In November 1921 coli were present in 0·1 cc. of the water and the colonies on gelatine had run up to 127 per cc. Chlorination of the water was immediately started and a standard of purity obtained (no coli in less than 50 cc.). Then the ratepayers complained and the quantity of chlorine was reduced; and an abnormally heavy rainfall during the month of March undoubtedly led to more pollution through the very porous soil. In April coli were present in '01 cc. and cases of enteric had already been reported by that date. On April 13th use of the water was discontinued, the reservoirs were chlorinated and the dead ends flushed, and water from the town mains was taken into use. This undoubtedly cut short the epidemic. The number of cases reported during the epidemic, week by week, from the first week, beginning 3rd April, to the last week; ending 30th June, was 1, 23, 59, 35, 17, 11, 5, 0, 4, 0, 0, 1, 0, a total of 156 cases, in addition to 60 cases in the Asylum.

The population of Auckland is 157,000; 11,300 persons live within the area supplied by Mount Albert spring; amongst these 195 cases

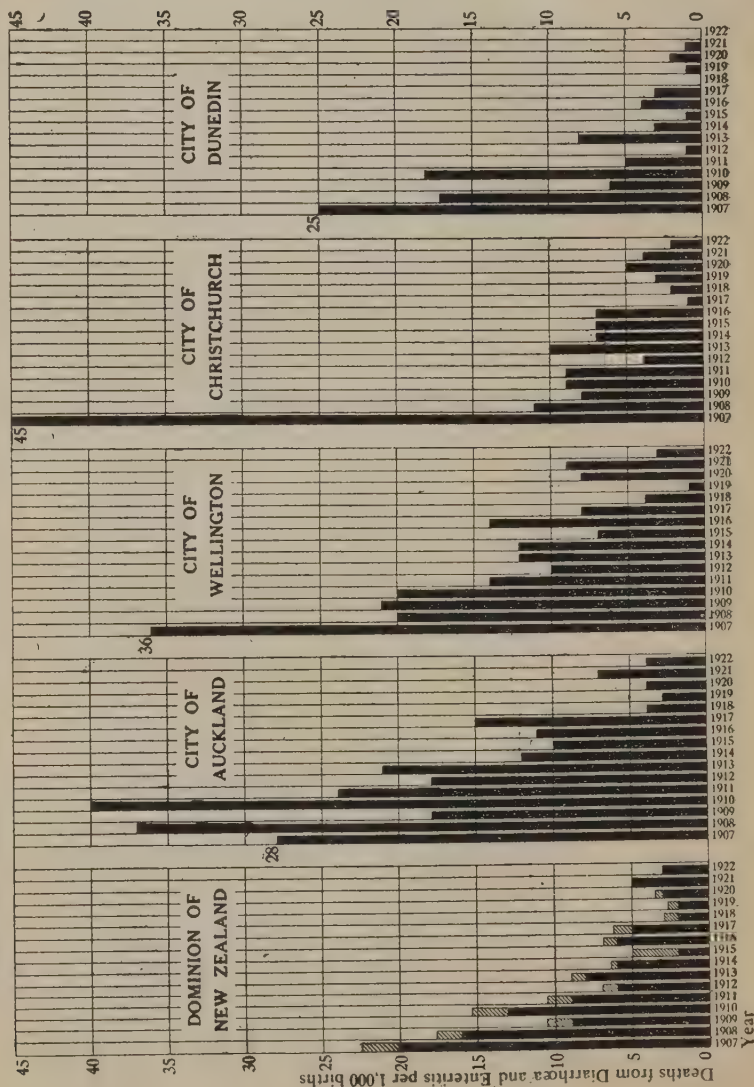


[Reproduced from the Report of the Director-General of Health, New Zealand, for the year ended 31st March, 1923.]

FIG. 26—Annual mortality-rates from gastro-enteritis and diarrhoea per thousand births, 1907–1922.

(1) *For the Dominion of New Zealand*—(a) The lower, solid, black columns show the deaths from diarrhoea in the first year of life; (b) the hatched part above shows the deaths in the second year of life; (c) the total height of each combined column shows the rate for the first two years of life.

(2) *For the Cities*—The columns show the death-rates from diarrhoea for the first two years of life, and therefore they correspond to the combined columns as given for the Dominion.



of typhoid appeared between April 7 and May 20th. In the 145,700 persons living outside the area 38 cases of typhoid had been reported. Of these 15 were amongst persons who, like the Point Chevalier school children, were known to be exposed to chance infection from the Mount Albert water supply. Government bacteriologists point out that true typhoids and paratyphoid A and B were all present.

The report also gives some extremely interesting figures on the Child Welfare Work in New Zealand. The accompanying chart gives the gastro-enteritis and diarrhoea mortality rates per thousand births.

SNYDER (J. J.). **A Report on the Sanitary Conditions of the Second Brigade, United States Marines, Santo Domingo, for the Year of 1922.**—*U.S. Nav. Med. Bull.*, 1923. Aug. Vol. 19. No. 2. pp. 170–181. [1 ref.]

The author has produced an extremely chatty and fascinating paper. He gives the history of the Colony and of practically all the diseases mentioned in the course of the paper.

The following brief summary is given in the author's own words.—

“What measures should be instituted to keep an expeditionary force fit for service in the Tropics?”

“1. Moderation in all things when possible—drills, athletics, marches, etc.

“2. Avoiding exposure combined with exertion during the heat of the day, unless unavoidable. The natives have shown that the siesta is of value.

“3. The food should be nutritious and well cooked, with an abundance of fruit.

“4. A water-boiling detail should be routine in camp or field.

“5. The insistence on the use of mosquito nets and careful nightly inspections by the sentries will show results in a low malarial incidence.

“6. Insistence on a follow-up treatment for every case of malaria, so that every known source of infection is eradicated.

“7. Co-operation between the provost marshal and the medical officers in the eradication of venereal disease.

“8. Insistence on antityphoid and cowpox vaccinations for the command.

“9. . . Homesickness is a very real disease, and . . . my belief is that it was one of the compelling reasons [of suicide] . . . .

“10. That the easiest, best, and quickest method of transporting patients in a tropical country is by airplane, and future hospitals, if possible, should be located near a landing field or have a landing field of their own.”

VENEZUELAN SUN LIMITED. **Medical Department. First Annual Report. Valera, Venezuela. 1922.** [DE BELLARD (E. P.)]—44 pp. With 1 chart. 1923. Caracas: Tipografia Americana.

The Venezuelan Sun Limited is mainly interested in oil concessions in Venezuela. The report shows that the Company operates in several very unhealthy places, particularly on the shores of Lake Maracaibo. The headquarters hospital is situated at Valera, 1,800 ft. above sea level with a dry, bracing air.

Malaria, chiefly benign tertian, forms a large proportion of the sickness. The writer strongly recommends in heavily infected districts a

large prophylactic dose of quinine daily, administered by a corporal or time-keeper to the labourers. The houses are screened by fine wire gauze and all rank vegetation for a considerable area is removed.

Dysentery is widely spread, one small epidemic of the vacillary variety, Flexner type, causing a few deaths, occurred during the year.

Ankylostomiasis is rampant and other helminths appear to be abundant.

The writer gives a very full and interesting account of trypanosomiasis and the reduviid carrier (*Rhodnius prolixus*, Stahl). He says that the native houses made of palm leaves are simply crawling with these animals, and it is extremely difficult to prevent bites even with properly adjusted mosquito curtains, as the insect's habits resemble those of the bed bug. A large percentage of *Rhodnius* is infected with trypanosomes, but in spite of this Chagas' disease is not very common.

An interesting account of climatic bubo is also given, its origin is discussed and the difficulties of treating it. The writer approves of excision of the glands as the best method of cure.

WOLFF (J. W.). **Geboorte, ziekte en sterfte in Suriname.** [Natality, Morbidity and Mortality in Dutch Guiana.]—*Nederl. Tijdschr. v. Geneesk.* 1923. Sept. 15. Year 67. 2nd Half. No. 11. pp. 1132-1138.

The census of 31 Dec. 1922 shows the number of inhabitants of the colony to be 112,999. Of the capital Paramaribo 44,833. From 1918 till 1922 the natality was 29.1—23.6—32.7—32.9—30.0, the mortality 3.3 [? 33.0]—26.3—22.9—23.7—19.1 per mille. In Paramaribo the corrected mortality and natality were 22.5 and 26.2 per mille.

The lethality (in percentages of total number of deaths) of typhoid is 3.5 in 1921 and 1.8 in 1922.

dysentery is	5.8	2.0	„
ankylostomiasis is	6.9	4.7	„
leprosy is	1.1	5.9	„
tuberculosis is	8.3	10.8	(all forms)
cancer is	3.2	2.8	„

3.5 per cent of the population are infected with *Schistosoma mansoni*, most of the sufferers belonging to the agricultural population. 300 lepers are treated in 3 asylums, 300-400 are free in the town and 50 more in the districts. A law is in preparation prescribing stricter measures.

50-60 per cent. of the town population is infected with *Filaria bancrofti*; special funds are available for combating *Culex fatigans*. 16.6 per cent. of the school-children in Paramaribo are affected with trachoma; in some rural districts this figure is 27 and 47 per cent.\*

ZIEMANN (H.). **Beitrag zur Bevölkerungsfrage der farbigen Rassen (Steigerung der Geburtenzahl und Verminderung der Kindersterblichkeit in den Kolonien. Ein kolonialhygienischen Programm der Vergangenheit und Zukunft).**—[The Population Problem of the Coloured Races. How to raise the Birth Rate and diminish Child Mortality in the Tropics.] *Metron.* 1923. July 1. Vol. 3. No. 1. pp. 35-109. [58 refs.]

The author calls attention to the sparse population of the former German Colonies.

\* Summarized by Dr. N. H. SWELLENGREBEL.



In Togo there were in 1911	11 persons to the square kilometer.
In East Africa „ „	6-7 persons „ „
In Cameroon „ „	5 persons „ „
In Samoa „ „	13 persons „ „
In New Guinea „ „	1-2 persons „ „
In South-West Africa „ „	1-4 persons „ „

whereas in Germany there were 120 persons to the same area. He contrasts the population of Java [265 to the square kilometer in 1920] with that of the Colonies named, and he notes that though he is not aware of any large emigration the population of [Western] Samoa, a group free from malaria, increased between 1906 and 1911 only from 33,478 to 33,554.

He considers his subject under three heads—

1. What are the reasons for the relatively small populations and the means of increasing them?

2. Special causes of the child mortality and the measures needed to prevent it.

3. Measures for increasing the birth-rate.

1. The subject is considered generally rather than territorially and the factors, taken up in turn, are the primitive forest, which mechanically checks expansion; deficiencies of clothing and of diet; lack of drinking water or its bad quality; and, amongst other decimating causes, slavery and intertribal wars (less operative now than formerly), superstitions, especially that of the causation of disease by human agency, secret murder sects, the necessity for collection of bodies of labourers for railway construction and the like, the carrier system; infectious diseases, *e.g.*, malaria, dysentery and worm diseases, smallpox, venereal disease, yaws, relapsing fever, tropical ulcer, leprosy, sleeping sickness, filarial disease, tuberculosis, alcoholism.

2. Statistics are given from the several colonies and chiefly from Cameroon and German East Africa.

In those from Cameroon attention is drawn to the number of barren women in the under-nourished coastal Kribis, in the Mwogatemenge with much venereal disease, at the military station of Soppo, and to the poor figures of the grassland where there is no malaria. In Ebolowa, according to Dr. JAGER, the causes of death among 821 children were as follows—born dead 190, unknown 177, malaria 115, intestinal diseases 110, lack of mother's milk 66, perished in war 44, yaws 31, chest diseases 15, and 6 lesser causes which do not include syphilis or small-pox.

Another table is a condensation of several pages of statistics from the *Kolonialblatt* (1914). Samples of every tribe in German East Africa were taken and the information was obtained from the natives. The net result is to show that owing to miscarriages and deaths in childhood the rate of increase is very small. In the Mojidjo district there are hardly any children; polygamy is said to be the cause, leading to prostitution and spread of venereal disease. In the Bukoba district there was one child to 2 marriages, among the Waheia one to one. In Karagwe 50 per cent. suffer from syphilis and 30 per cent. from gonorrhoea, and under-feeding is general, so that the mothers are ill-nourished, lose their milk, and give the children unsuitable food. Among the Wadschagga 50 per cent. die in the first year of life. In Kilwa 56 per cent. of children are said to die of malaria and 35 per cent. of intestinal catarrh. A leaflet on the feeding of children here was so much in demand that it had to be reprinted. The author puts in a caveat to the effect that these figures were likely taken from natives at work away from their homes and

hence out of their proper environment, which if it did not affect the birthrate would certainly influence the mortality.

The table shows that of 78,000 children born 23·1 per cent. died under one year and 18·2 per cent. in later years, leaving 58·7 per cent. living children, and that to each of 45,850 women there were 1·8 births and 1·08 surviving children. The sex proportion of the children born was 103 male : 100 female, but there are great differences in the several tribes. As he states, the figures generally must be studied for each tribe. One set of Mission statistics may be given—951 women under 40 and of an average age of 23 had 297 miscarriages, 897 children dead under one year, and 221 dead over that age, *i.e.*, 1,118 dead children ; 441 children living under one year and 973 living over one year, *i.e.*, 1,414 surviving ; 2,532 children in all, to each woman  $2\frac{2}{3}$ , one of whom had died. 35·4 per cent. died in infancy and 8·7 later, the total mortality being 44·1 per cent.

Into the figures for the (former) German South Sea Islands there is not space to go ; the population was falling and in nearly all cases boys were in undue proportion to girls (*e.g.*, Caroline Islands, 112 : 100).

From the statistics available the author lays down certain rules for future statistical research. The figures from each colony must be made out so as to be comparable. Samples, to consist of not less than 1,000 souls, must be taken from tribes in their natural surroundings and the observation repeated if possible every year. The total population in men, women and children is required. Age is difficult to assess, but two periods are recognized by every woman—the onset of menstruation at 12–13 and the menopause at 40, the limits of the child-bearing age. The age in native men when power of procreation is lost is unknown. Ziemann notes that in Germany in 1910 for every 1,000 persons over 15 years there were 520 under that age, the corresponding figure in England being 442. Other data required are the sex proportion in infants, in older children and in adults. Whereas the ratio of male to female children in Germany was between 105 and 106, in Africa it was 102 ; in the South Sea much more. A high proportion of men to women is believed to be a sign of race degeneration.

Other data wanted are the number of births per 100 women capable of bearing, including still-births and miscarriages ; in Germany the figure in 1909–11 was 121 : the infantile mortality (first year of life), and the mortality between this period and the onset of puberty ; this is low in Europe but high in natives : the causes of mortality at both these periods.

The causes of child mortality discussed in detail are, miscarriages, custom of infanticide and exposure of children, lack of expert assistance in childbirth, failure of milk in native women, lack of suitable food, diseases.

*Abortions* may be natural or induced. Natural abortions are caused by malaria and possibly relapsing fever ; by syphilis, under-nourishment of the mother and other causes. The ways are described of estimating the effects of malaria on infantile mortality in regions of epidemic and of endemic malaria ; in the last named comparison must be made with a neighbouring healthy region. In India, after a severe malaria epidemic, there was a fall in births, reaching its lowest point 9 months after the malaria had attained its maximum. Induced abortion is found in all colonies. Pregnancy is interrupted if the woman believes that owing to either lack of milk or underfeeding she cannot nourish the child ; tribal customs are another cause. Little is known of the

means employed, but it is probable that the woman is often left sterile.

The custom of *infanticide* is widely spread. Deaths of mother and child from *want of skilled help* at birth is, he says, not infrequent. The *milk often fails* because the mother is insufficiently nourished. The period of lying-in varies much with the tribes; with one tribe named it is a fortnight, but much more frequently it is one, two, or three days, after which the mother resumes heavy field work. This Ziemann thinks must injure the milk production. Many infants are suckled to the second or third year of life.

The milk of cows, asses or goats is not given, but indigestible carbohydrates are, and do great damage, causing severe intestinal catarrhs. The author points to the advantage of persuading the natives to use other milk when human milk fails, but notes that owing to disease there are insufficient cattle. There is an intimate connexion between the breeding of cattle and of men. Among *diseases* malaria, and intestinal and worm diseases are the most important, but there is little exact knowledge; measles is put high in some reports.

### 3. *Measures for increasing the births—*

Here are discussed the means of getting rid of child marriage, and of heavy work for women, the regulation of wife purchase and polygamy. In Usukuma in East Africa girls are married at 8 or 9 years. If such bad customs are to be extirpated the reason must be explained to the natives, who must be persuaded that the change is for their own good. With the introduction of agricultural machinery it may be possible to spare the women heavy work on the land. In some colonies the price of a wife is so high that they become the property of capitalists past the procreative age. One African chief had 300 wives, but not more than 136 children. If the women had each a husband the total fertility might have been tripled. Customs such as these can be changed only gradually.

Under the heading, Government Measures, a number of other means are discussed for improvement of health in the colonies. They include the instruction of all Government officials, as well as doctors, in all that pertains to tropical and native hygiene; increase of sanitary personnel; systematic instruction of the whole population (1) at conferences of chiefs, (2) in government and mission schools, (3) by means of cinematograph displays illustrating physiology and hygiene, and explained preferably by a native at native gatherings such as markets; formation of sanitary boards in all the larger towns; hygienic supervision of all agricultural and industrial undertakings, as far as natives are concerned, and hygienic control of rest houses; regulation of drug stores so that drugs such as quinine are available to natives free or at cost price; development of the government laboratories found in most colonies into research institutes to investigate disease and disease carriers; formation of agricultural institutes to conduct systematic enquiries into vegetable foods which are found in the colony or might be introduced. Potatoes introduced into the highlands of the Cameroons were gladly cultivated by the natives. The agricultural institute would form a collection of all fruits, drugs, and poisons, and would, above all, further the culture of cereals. Rice culture could be greatly extended, and, preferably, mountain rice, to avert the danger of malaria infection. The institute would also introduce the art of baking bread, which is little known among natives, who, however, eat European bread with avidity. The study of edible oils is of great importance. It would provide on a large scale a



supply of reliable drinking water at all places in the colony, and see that trade routes and road junctions had springs, etc., so enclosed as to render infection impossible. By means of the schools it would instruct the natives in the food value of their articles of dietary and draw up tables for the use of the employer of labour. Child study would be pursued at one or other institute, the feeding of children and children's diseases, and breeding of cattle, for the lack of which in part the native is under-nourished. This includes the study of animal diseases. Agriculture, cattle breeding and increase of human population are in the tropics closely linked.

### MISCELLANEOUS.

DUREN & LEJEUNE. **Voyages d'Etudes au Brésil.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1923. Nov. Vol. 3. No. 2. p.p. 77–155.

The sanitary organization of the United States of Brazil is described in all its official detail in this paper. The sanitation of the ports and large towns is said to be well planned and well administered; that of the vast interior is happily described as “establishing itself progressively.”

The sanitary administration of the whole country is centred in a Department of Public Health under a Director-General. Into the personnel and structural details of this Department it is unnecessary to proceed further than to mention the three immediately subordinate Directors, respectively, of Municipal Sanitation (for the Federal District), of Rural Sanitation (for the whole country), and of Maritime and River Sanitation (for the whole country). The Director-General and 3 Directors, along with the respective Heads of the Army and Navy Sanitary services, the Professor of Hygiene of the University, the Professor of Sanitary Engineering of the Technical School, and the Advocate-General, constitute a Council of public health under the presidency of the Minister of Justice. This Council considers the proposals and resolutions of the Department of Public Health and submits them to Congress.

The regulations for dealing with Yellow Fever, plague, cholera, typhus, smallpox and other epidemics do not demand notice; but something may be said of the measures actually in existence for the control of tuberculosis, leprosy, and venereal diseases.

*Tuberculosis*, which is prevalent in Rio and becoming noticed in Bahia and Saint Paul but very little in evidence elsewhere, first attracted attention in 1899. In Rio, where it and infantile mortality are the two most important elements of the death-rate, the mortality from tuberculosis in 1921 was 3·9 per mille. The disease, of which 96 per cent. was pulmonary, occurs chiefly among the poorer classes, who are addicted to alcohol and are debilitated by ankylostomiasis and malaria. Bovine tuberculosis is not common. For dealing with tuberculosis at Rio there are six dispensaries and fourteen visiting nurses; there is, of course, a bureau and a flawless code of regulations, including obligatory notification, to which private practitioners strongly object. In Saint

Paul also there are some tuberculosis dispensaries, but nothing has been done elsewhere.

The statistics of *leprosy* are allowed to be not reliable; the number of lepers in the country has been estimated by LUTZ as 20,000 and by RABELLO as 10,000. The States most affected are Minas Geraes, São Paulo, Maranhao, Pernambuco, and in Rio de Janeiro there are known to be about 3,000 lepers. At Bahia there is an antiquated lazaret, and at Rio there is a leper hospital.

*Venereal disease* is much prevalent throughout Brazil, not only in the towns but in the interior of the country. Syphilis is regarded by the Brazilians as a trifling and merely unlucky disease. Unfortunate females are extremely numerous, and they are doubly unfortunate because they are not officially recognized and treated, although they wish to be. At Rio there are 15 free dispensaries for antivenereal treatment and a staff of visiting nurses, and instructional propaganda is carried on, all under a Director and Bureau. In other States there are a few dispensaries.

As an adjunct to the Antivenereal Bureau there is a cancer section. The deaths from cancer, which in 1903 were 33·9 per 100,000 in Rio and 29 per 100,000 in São Paulo, had increased in 1917 to 50·9 and 59 per 100,000 respectively.

The Department of Rural Sanitation is a very recent affair and has still to contend with the ignorance and prejudices of the population. The Director, with his office, laboratories, and other apparatus, is located in Rio. Distributed among the States are 16 District Chiefs, each of whom has a very free hand in administering his own province. The executive machinery is established in rural sanitary outposts, of which there are altogether about a hundred at the present moment. In each outpost there is at least one doctor, a microscopist, a secretary-store-keeper, a staff of medical subordinates, and a corps of labourers, and each is equipped for receiving and treating out-patients, for operations, and for microscopic investigations, and is also furnished with the transport (horses, boats etc.) necessary for inspection work. The outpost thus appears to render medical assistance to the rural population as well as to implant the principles and practice of sanitation. The sanitary routine of the outpost includes inspection of houses, latrines, wells, surface-drainage, etc., the rectification of defects, and the detection and treatment of cases of disease. Census operations are included in the statistical work.

In addition to the machinery already mentioned the Department of rural sanitation includes a staff of six medical men, under the orders of a chief, whose duties are to travel through the country and impart elementary instruction in hygiene to the population, in schools and elsewhere.

The author gives a full account of what is being done by the Department to control malaria, helminthiasis, trypanosomiasis, leishmaniasis, and trachoma. In connexion with malaria it is to be noted that although it is most widely prevalent in Brazil, yet there are extensive rural tracts—particularly in the State of São Paulo—which are free from malaria though all the necessary conditions appear to be present. Another noteworthy item is that the large towns in southern Brazil are free from malaria (except in the suburbs), while those of northern Brazil (Bahia, Pernambuco, Belem) are strongly infected.\*

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\* Summarized by Lt.-Col. ALCOCK.

COMBY (J.). **Un voyage médical au Maroc.**—*Presse Méd.* 1923. July 11, 18 & 25. Vol. 31. Nos. 55, 57 & 59. Supplement. pp. 1145-1153; 1189-1205; 1229-1238. With 28 text figs. [4 refs.]

This is a report of a tour of medical inspection in the French Protectorate of Morocco. The writer is enormously impressed with the sanitary revolution that has been effected in the short term of ten years in a country not long since scourged by plague and typhus and smallpox, where malaria is rife, where tuberculosis works havoc in towns and villages, where the population is saturated with syphilis, and where a cynic might have been pardoned for regarding the frightful infantile mortality as a disguised blessing. He writes with almost overwhelming appreciation both of the foresight and of the results of French policy, and his justification may be found in the following dry details.

The new port of Casablanca, where the author landed, has become a fine European model. Its population, which was about 30,000 in 1911, had increased in 1921 to more than 103,000, not including a large floating element. Here the care of the public health is in the hands of the Director of Army Medical Services. The medical institutions include a military hospital of 500-635 beds, a civil hospital of 160 beds, a natives' hospital of 4 pavilions for men and for women, a central pharmacy where drugs for the whole country are prepared and stored, an anti-tuberculosis dispensary, and a venereal dispensary where also the "files soumises" are under prophylactic administration. The sanitary institutions include a "Goutte de Lait," where infants are seen and obtain sterilized milk and pap, a "Pouponnière" where young children are received and cared for and whence sterilized milk is distributed, a children's dispensary where vaccination and other treatments are performed, a municipal milkery where 52 first-class cows are stalled to feed the children's institutions and hospitals with milk, and a lazaret into which the beggars are raked and cleaned and loused and disinfected.

Mazagan, a salubrious town swept by sea-breezes, contains about 20,000 inhabitants. Besides hospitals for Europeans and for natives it is the head-quarters of one of the mobile hospitals that carry European medicine and French prestige into the interior.

Safi, an Atlantic port with a population of about 25,000, seems to be distinguished for its enormous infantile mortality; of the recorded deaths (year not stated) among the native population exactly half are children.

Mogador, though enveloped by sea and lagoon, is very little malarious. Besides the ordinary medical institutions it possesses a modern lazaret. Syphilis is rampant among the Mahomedan population, and abortions due to it are countless.

Marakesh (Morocco), the southern capital, is a walled town in a vast plain and contains about 150,000 inhabitants, including 15,000 Jews and several thousand Europeans. MAUCHAMP, who two years afterwards was assassinated, established a dispensary here in 1905: the fine new hospital for natives, named in memory of him and opened in 1915, contains 146 beds, in pavilions. Adjoining it are a large out-patient dispensary and a venereal clinic. The Military Hospital, installed in a former Sultan's palace, contains 175-200 beds besides an isolation pavilion and pavilions for officers and for European maternity cases. A "Goutte de Lait" was established in 1922 and is popular; it is administered by Franciscan sisters under medical



direction ; vaccination is carried on, besides distribution of sterilized milk. A mobile dispensary works from Morocco. Although Morocco is little malarious and is considered a healthy town, fit in winter for consumptives, a good many Senegal troops suffer from pulmonary affections.

Rabat, founded in the 12th century by Yakub-el-Mansur, is a town of about 35,000 inhabitants in which the proportion of Jews (3,300) seems to be rather lower than usual and that of Europeans (10,200) higher. Connected with the large military hospital there is a section of 100 beds for civilians, also a vaccine and an antirabic centre. The hospital for natives, opened in 1918, has 120 beds ; a mobile dispensary is based on it. The maternity hospital would do credit to a European capital ; annexed to it are a "Goutte de Lait," distributing sterilized milk, a "Pouponnière," a Nursery (33 boarders) and Crèche, also a Sun-garden for physical culture of weaklings. Franciscan sisters render much assistance in these institutions. An anti-tuberculosis dispensary and a dispensary for children are attached to the Bureau d'Hygiène. Besides the municipal institution for the management of prostitutes, there is a combined clinic for venereal and skin diseases where intravenous injections are given to thousands. An attempt to exact payment for injections had deplorable results for syphilis prophylaxis. The municipal Lazaret is well equipped but commendably unostentatious.

Sale, an old town of 22,000 inhabitants, has a good climate, but pulmonary tuberculosis is common, and among children ringworm is very frequent. Here, however, is the shrine of Sidi Ben Achir, where afflicted pilgrims innumerable come for cure, and here also is a convalescent home for the army.

Meknes, founded by Mulay Ismail, a contemporary of "Le Grand Monarque," stands at an elevation of 500 metres and is accounted the healthiest town of Morocco. Amid imposing ruins of his palaces the numerous aqueducts constructed by Mulay Ismail still keep the inhabitants, who number about 45,000, well supplied with good water. A very fine military hospital, built during the war, also provides accommodation for European civilians and a pavilion for maternity cases. The hospital for natives, built in 1921, has very extensive and complete arrangements for outpatients, including venereals. Outside the town is a larger hospital of 43 beds for natives. Tuberculosis is rife in Meknes, more so among the rich (in whom a taste for alcohol is spreading) than the poor. An anti-syphilitic dispensary for women is situated near the quarter inhabited by the "filles soumises," who number about 250. A pitiable feature of Meknes is the native lunatic asylum, where, bereft of humanity, men and women are chained like animals.

Fez, the holy city, the most ancient and most famous of Moorish capitals, has a population of more than 100,000. It is really three cities, one of which, well removed from the others, is a modern European town. The military hospital, which stands in an immense garden and is also a *place d'armes*, contains a section for European civilians, a pavilion of 40 beds for women and children, and provision for maternity. There are two large hospitals for natives, one of 70 beds in the city, the other of 250-300 beds outside it. There is also an anti-tuberculosis dispensary and a dispensary for venereal and skin diseases. In the latter dispensary there were, in 1922, 23,543 operations for syphilis, 7,972 treatments of ringworm, and 16,196 treatments of other diseases

of the skin. Care of "filles soumises" is efficient. The native lunatic asylum, though here visited by a European doctor, is, like that of Meknes, under indigenous administration, and a scandal.

Sefrou, 28 kilometres from Fez., is an oasis of running waters, groves, and orchards. The native infirmary, with few beds but ample provision for a crowd of out-patients, is one of a common Moroccan type. At Oudjda, the principal town of eastern Morocco, with a population of about 25,000, there is a separate European settlement. Besides the military hospital, with its sections for civilians, including women and maternity cases, and besides the native hospital, dispensary for prostitutes, and lazarette, there is a "Goutte de Lait," where, however, only condensed milk is available, and an Orphanage and crèche; these are administered by Franciscan sisters.\*

PETER (W. W.). **Observations on Public Health in the Orient.**—*Amer. Jl. Public Health.* 1923. July & Aug. Vol. 13. Nos. 7 & 8. pp. 531-538; 627-635. With 4 figs.

This paper contains probably the most instructive survey of health conditions in the various countries of the East that has ever been published. It is impossible to speak too highly of it, and one can only hope that it will attract the attention of the Government of India. The first section deals with the Philippines, Siam and the Federated Malay States; the second with India.

When the Americans took over the Philippines they inaugurated a thoroughly modern health organization. Since then much has been accomplished, in the short period of 25 years. The two outstanding features of the work are (1) a good foundation and (2) devolution to the point where practically the whole machine built up by Americans is now being operated by Filipinos.

"From the beginning there was little co-operation on the part of the people. For the first few years this may have been due to political reasons combined with general ignorance of what was involved. The first factor has been removed to a large extent, but the second is operating, and may be expected to continue until the results of the present educational policy begin to manifest themselves. Public health can never have sound foundations in a country where the percentage of illiteracy is as high as now obtains in Oriental countries. Coercive laws are not sufficient in the long run, because it takes too much money and machinery to carry them into effect . . . .

"I was told that the public-health machine started by Americans has suffered deterioration upon being turned over to the Filipinos. This should give no one serious concern. It would have been surprising had such a slump not taken place in the process of devolution. The commendable thing is that both sides saw the wisdom of making the transfer, which had to come some time. The present machine is working more smoothly each year. The legislature is also inclined to grant money for public-health work. In 1919, \$1,270,268 was appropriated from the national treasury for public health, and this sum was increased by \$100,000 the next year. In addition to these amounts, the various local governments appropriated \$434,000, making a total of about seventeen cents gold per capita for public health, which is not a bad showing in a country where the public-health movement is comparatively young."

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\* Summarized by Lt.-Col. Alcock.

The writer lays great stress also on the work done by the Child Welfare Centres both as directly affecting the health conditions and as centres of enlightenment.

*Siam* covers an area of 24,390 sq. miles and has a population of 8,266,000, the largest number of imported residents being Chinese. The capital, Bangkok, has a population of 324,000. The Siamese Red Cross Society takes the place of the Government Public Health organization of other countries and is closely associated with Government itself. At Bangkok one finds modern hospitals and very finely equipped laboratories and Government dispensaries.



FIG. 27.—A section of a public health exhibition under auspices of the Siamese Red Cross, at Bangkok, Siam, illustrating the cause and methods of prevention of hookworm disease.

[Reproduced from the 9th Annual Report of the International Health Board, 1922.]

“ Under Government auspices 3,418,444 vaccinations were performed at the rate of 380,000 per year. On one occasion at the outbreak of a smallpox epidemic in an inaccessible region (Ubol) a medical officer with a large quantity of vaccine and 100 kilograms of emergency supplies was taken over the mountains by airplane and thus reached the scene two weeks earlier than by ordinary methods of travel. The Red Cross now has a special airplane provided by popular subscription which can carry four sick or wounded or a corresponding load of medical supplies . . . . .

“ To provide one qualified doctor to every 2,000 of the population Siam needs 5,000 doctors, or 200 graduates a year for the next 25 years.”

Vital statistics in Siam are still very unreliable, but since the introduction of registration the birth rate is shown as about 32 and the death rate about 31. A pandemic of influenza caused 80,000 deaths. From Feb.-March 1921 there were 18,000 cases of cholera with 13,000 deaths.

“ Here we find a stable, enlightened absolute monarchy, giving every evidence on the one hand of desiring to institute modern public modern



health procedures, yet on the other hand feeding the people large quantities of opium. The economic side of the question is the fact that about 35 per cent. of the total revenue of the government comes from opium. Out of a total revenue in 1919-20 of £6,424,117, as much as £1,935,131 was received from the manufacture and sale of opium . . . . .

"Nowhere in the Orient can we find a problem of national administration where opium plays so large a part . . . . .

"In 1918-19 out of a total of 2,986 primary, secondary and special schools, 563 were government and 2,423 were non-government. Out of total of 4,457 teachers in these schools, 2,825 were non-government. Out of 160,398 students in these schools 46,527 were in government schools and 113,871 in non-government schools . . . . .

"Coming from China, where it is the exception to find anything but the greatest indifference among officials of all classes regarding the importance of public health, Siam presents an encouraging contrast. The officials are justly proud of what has already been achieved. Relatively large sums of money have been and are being expended for public-health work. One gains the impression that public health has been placed near the top of the government lists and that progress will be made as rapidly as ways and means can be found."

*Federated Malay States.*—The facts concerning this country are well known to all our readers through the Government Annual Reports.

"Public Health work in the Orient is of two kinds, that started from within and that added from without. What one sees in the Malay Peninsula offers perhaps the best example of the second kind, for all administrative affairs are directly or indirectly in the hands of the British Government. There can be no question but a great deal of the prosperity of this region is due to the effort which is being expended in safeguarding health . . . . .

"The country in comparison with some of the other regions of the Orient is new and therefore more easily administered in the absence of deeply rooted social and religious customs. The mere fact that a large part of the population is immigrant, that is, people who by leaving their native lands have shown a willingness to break with old things, makes the question of public-health administration much easier than in a country like India, where the roots are deep and where too much pressure is interpreted to be an interference with personal liberty. Political agitation is absent, and those in charge have a clear field before them. Having the support of those engaged in commerce and in the great rubber industry there is always the backing the public-health man feels is necessary."

*India.* In the second paper the writer discusses the condition of public health work in India; he goes into the history of the work, the population, birth and death returns, and quotes from annual reports, etc., to illustrate his survey. Many of these facts are thoroughly well known to all acquainted with the situation in India. He concludes his remarks thus :—

"In drawing all this discussion to a conclusion let me pass into regions where the ice is thin and the waters are deep. The present state of health conditions in India I would attribute chiefly to four causes; politics, poverty, ignorance and religion, with what seems to me the most important last.

"I have quoted from reports showing where politics interfered with carrying on public-health work. Non-co-operation has caused some

queer ideas to become bedfellows. A non-co-operator will refuse vaccination because it is British. He will ride on a train and use the telegraph and postal systems in spite of their being British. I met some of these men. To one of them I said: 'I cannot understand why you want to force out the British [by] boycott, the public health men who advocate vaccination for example. If you were wise, you would strengthen your hand by making the fullest use of existing facilities for protecting the health of the people. Why not keep right on taking the medicine out of the spoon even up to the moment you grab spoon and bottle away from them—if that's what you are after, to be your own political doctor or at least consultant. India should keep on taking her health medicine. The British won't put poison in the spoon. They haven't the imagination.' But all I received was a weary shake of the head, indicating that I did not understand. In the meantime the total number of vaccinations fell 11·5 per cent., that is, from 10,870,446 to 9,624,235, in one year. The decrease was general through all the provinces and the chief explanation seems to be the political reason mentioned.

"Poverty is a real obstacle, as we all know. It is often said that fifty million people in India never get all they want to eat. Poverty in India has many roots; continually impoverishing the soil by burning the needed manure, early marriage and too many children—a host of causes, many of which are not without a direct bearing upon public health.

"I wonder if I may speak frankly about the religious side of the health question without being misunderstood. The atmosphere of India, social, educational, political, is surcharged with it. I found more of it to the square inch than in any country I ever visited, and of a more pronouncedly disagreeable type . . . .

"At every turn the public health man is blocked by religion and custom, and no outsider can tell where the one leaves off and the other begins. Caste may be considered as a social custom, but it had its origin in religion when the Brahmins claimed that they were better than ordinary folks. Turn whichever way he will, the aspirations of the public-health man are ground to dust in the mill-wheels of religion. If he dares so much as to whisper against prevailing practices, the backs of the people are raised at once because he is interfering with religious freedom . . . .

"Religion kills more people in India to-day than the British public-health machine could save if it were trebled in size. I am not dwelling unnecessarily on a subject which concerns only a small fraction of the population. The census of 1911 gave the following religious statistics:

Hindus	...	...	...	...	217,586,892
Mohammedans	...	...	...	...	66,647,299
Buddhists	...	...	...	...	10,721,453
Christians	...	...	...	...	3,876,203
Sikhs	...	...	...	...	3,014,466
Jains	...	...	...	...	1,248,182
Parsis	...	...	...	...	100,000
Jews	...	...	...	...	20,980
Miscellaneous	...	...	...	...	37,101

"So the majority of the people, instead of having a religion which stimulates them or at least tolerates the improvement of living conditions, have a sedative which lulls them into believing and hoping that the next turn of the wheel of fate may see them in a better state—perhaps

so high up in the scale of things as to be reincarnated as a Brahmin or something equally desirable (or detestable, depending upon one's point of view). In the meantime the public-health man has to make the best of a bad situation and fight against great odds.

"Ignorance is another stumbling block in the path of the public-health man in India. Census returns show that among males 16,938,668 are able to read while 143,480,620 are not, even though there are 28 different languages to choose from to make the test. With women the situation is still worse, 1,600,763 being able to read while 151,397,030 are totally illiterate . . . .

"The seeds of public health have been planted in every large country in the Orient. In no country has public health reached a stage of development comparable with European countries. The work may still be considered to be in its infancy. The drawbacks which apply particularly to the Orient are poverty, ignorance, and in some instances religious and political considerations. With the exception of Japan, the whole science of public health may be said to have been introduced into the Orient by foreign nations, and in no country has it become entirely indigenous. Public Health will not become firmly rooted in Oriental soil until the people make it a part of themselves. The greatest means for advancing public health in the Orient at the present time lies in actual demonstrations and education."

WU LIEN TEH. **China's Place in the World Health Movement.**—*Nat. Med. Jl. China*. 1923. June. Vol. 9. No. 2. pp. 148-159.

A discursive article, which deals with a memorandum from the League of Nations and the visit of Dr. Norman WHITE to China. It ends with a description of certain other phases of activity of the Health Section. The following paragraph gives a lurid picture of the state of affairs in China.

"Present health activities in China.—In spite of several attempts on the part of leaders of public health thought to keep this country abreast of the times, the government authorities have not yet taken up the matter seriously. The responsible work is still neither cohesive nor coherent, and the initiative is given to men untrained in the latest labour saving and money saving methods. The enforcement of sanitary measures is left in the hands of poorly educated, poorly paid police officers, who with their underlings are often quite ignorant of their real duties. Taxing of shops, rickshas, carts, prostitutes, theatres, and the licensing (the more the merrier) of unscrupulous venereal disease quacks appear to be their chief concern. The prevention of overcrowding, supervision of food and water, recording of births and deaths, being non-payable assets, are quite overlooked. It is true that, in Japan, the main health authority of a town is the chief of police, with a medical man under him, but the latter is a trained man and his advice is usually followed. In China the sanitary assistant is often a mere Chinese scholar with no knowledge of medicine or modern health work, and hence the results obtained are negligible."

HEALTH. Melbourne. 1923. Sept. Vol. 1. No. 8.

The September number of this Australian journal contains many excellent articles. One by Phyllis CILENTO gives a very good survey of the whole subject of dietary for hot countries.

The second article deals with the physical fitness of different races in



tropical countries, and it is gratifying to learn that the northern races, particularly the British, give the most satisfactory out-turn of work under adverse conditions.

Other papers are Housing, by T. W. SINCLAIR; Post sanatorium considerations, by Keith R. MOORE; Women in factories, by Frank R. KERR.

Under the head of Notes is an extremely interesting article on the pollution of streams and other natural waters of Australia. The writer states that the amount of pollution is increasing in Australian rivers; measures should be taken at once to complete the legal aspects of the subject in order to conserve the water for drinking purposes.

"As a measure of first importance the necessity for gaining more complete knowledge regarding the quality of natural waters, the sources and character of existing pollution, and the effect of such pollution upon natural waters, is again emphasized, and the desirability of having public health laboratories equipped to carry out these investigations is pointed out.

"Prevention should be organized while it is simple and cheap. 'A sincere adherence to that principle, and its vigorous application through sound and comprehensive legislative measures, far-sighted administration, and the best technical service to be had, will save Australia the tragedy of the numerous spectacular outbreaks of water-borne disease which have disfigured the health calendar of many of the older countries which have been forced to learn by sad experience.' It will also save limitless trouble and expense in remedial measures."

MANN (W. L.). **Some of the Functions of the Naval Medical Personnel serving in the Field, with Special Reference to Field Sanitary Measures.**—*U.S. Nav. Med. Bull.* 1923. Dec. Vol. 19. No. 6. pp. 735-813. With 31 text figs.

This is, practically, a sort of Field Service Manual for American forces. It occupies some 80 pages of the Journal and deals with camp latrines and sanitation, the hygiene of marching and care of the feet, water supply, anti-fly measures, etc., as well as organization of hospitals and duties of the bearer corps. It will be useful for those interested in this particular branch, but it contains little that is not to be found in the British publications on the same subject.

ROBERTSON (H. McG.). **Automobile Cost in Rural Health Work. Report on Operation of Automobiles in Co-operative Rural Health Work in Virginia.**—*Public Health Rep.* 1923. Aug. 31. Vol. 38. No. 35. pp. 2012-2016.

The writer gives some figures concerning the cost of up-keep and depreciation of motor cars supplied to Officers on Sanitary duty in Virginia. The actual figures are not of general interest, because no two parts of the world are the same, but it may be pointed out that the running costs of a 22½ h.p. motor worked out at approximately 41.69 dollars per month. 34 automobiles were purchased, 10 were not in use at the time of the report, 2 were transferred, and 22 were sold, 14 at a profit and 8 at a loss. We consider the main point of interest to be that the automobiles were supplied to the Officers free by the Authorities employing them.

CORPUS (Teofilo). **The "Hilot" and "Salag" versus practising Physicians and Health Workers.**—*Monthly Bull. Philippine Health Service*. 1923. April. Vol. 3. No. 4. pp. 133–135.

The writer deals with the indigenous midwife and her attendant in the Philippine Islands. She appears to be an altogether ignorant person and frequently responsible for infection of the mother at child-birth; indeed she is similar in every respect to the Indian "dhai" about whom a great deal has been written. The writer says that at present it is impossible to banish this type of midwife but before long it is hoped to substitute a properly trained nurse.

DINGUIZLI. **De la nécessité de créer des auxiliaires visiteuses musulmanes pour propager les notions d'hygiène dans la population indigène en Tunisie.**—*Bull. Acad. Med.* 1923. Dec. 27. Year 87 Vol. 90. 3rd Ser. No. 44. pp. 613–624. (Rapport présenté par M. V. WALLICH. pp. 611–613).

The writer gives an extremely interesting account of the conditions of childbirth in Tunis. It is extraordinary how similar this problem is in practically all parts of the East. The description tallies almost exactly with that of the Mohammedan household in India and other hot countries.

The remedies tried are also the same, namely, the provision of properly educated Mohammedan midwives and of schools where they can be trained. A course of studies is outlined. It differs very little from that of other organizations.

AMERICAN JOURNAL OF PUBLIC HEALTH. 1923. July. Vol. 13. No. 7. p. 588.—**Rockefeller Foundation is Ten Years Old.**

The expenditures during the first decade, 1913 through 1922, have amounted to seventy-six and three quarter millions dollars (\$76,757,040), roughly divided as follows:

Public Health \$18,188,838; Medical education \$24,716,859; War relief \$22,298,541; all other philanthropic work \$10,445,628; administration \$1,107,174.

HEALTH FORUM. 1923. Sept. Vol. 1. No. 3.

"Health Forum" is the official organ of the Public Health Association of Australasia and is published quarterly. Some of the contents of the September number may be noticed. "The Modern Sanitary Inspector," by J. ELKINGTON, is written in a distinctly light vein, as the following amusing extracts show.

"Those concerned with food inspection may be interested to recall that the official beer-tester of mediaeval days in England was an important functionary who may fairly be claimed as a forebear of their own. He did not use a hydrometer, nor did he divide his sample into three parts. His sampling outfit consisted of a pair of leather breeches and an oaken stool, and with this simple apparatus he made his analysis on the spot. The technique was to call for a measure of beer, pour a little on the stool, sit on it in the official leather breeches, and consume the remainder of the sample. If the breeches stuck to the seat after a reasonable period of contact, the beer was classed as satisfactory. If not, proceedings eventuated. If the vendor were found guilty he was

condemned to stand in the stocks, to have a measure of the adulterated product poured over his head, and to drink the remainder. The sanitary administrator of to-day is sometimes tempted to regret that these simple and homely but certainly effective penalties have been allowed to fall into disuse . . . . .

"A favourite prophylactic measure in those days was to collect and burn all Jews. One would be inclined to conclude that the profound impression liable to be made on the very acute minds of this intellectual people would have resulted in producing a great Jewish sanitarian during mediaeval times, but no record of such has come down to us . . . . .

"The death rate from diphtheria in 1916 was the same as it was in 1896, and diphtheria has spread uninterruptedly for years past. It killed 917 Australians in 1921. We lose 8,000 to 9,000 infants every year, of which the majority die from preventable causes. Over 1,700 children under two years of age die annually of diarrhoea. Tuberculosis kills another 3,500 Australians annually, of whom the great majority are at the best working ages. More than 200 Australian women die of puerperal septicaemia every year. Typhoid fever killed 352 Australians in 1921 and pneumonia slew over 2,000 more."

The writer then goes on to lay down what he considers to be a sound method of training for sanitary inspectors under Australian conditions.

"Sewage Treatment in Unsewered Areas, by E. COBB, discusses the case of isolated houses where sewers and the water method of sewage removal is impossible. The tank described is very similar to those used in country houses in England, the dimensions recommended would be approx. 6ft. deep, 2ft 6ins. wide and 13 ft long. The writer also recommends twin tanks.

## REVIEWS.

VAUGHAN (Victor C.), assisted by VAUGHAN (Henry F.) & PALMER (George T.). **Epidemiology and Public Health. A Text and Reference Book for Physicians, Medical Students and Health Workers. In Three Volumes. Vol. I. Respiratory Infections.** 688 pp. With 83 figs. **Vol. II. Nutritional Disorders. Alimentary Infections. Percutaneous Infections.** 917 pp. With 53 figs. 1922. London: Henry Kimpton, 263, High Holborn, W.C. [Price 45s. net each vol.]

The author of this valuable work is a man of large experience, who from childhood has been in observant contact with sanitary problems. He has been "through the mill" more than once, and has met and fought epidemics of infectious disease under many and varying conditions. Throughout the two first volumes, now under review, the reader may recognise with certainty the hand of the expert. The accumulated practical experience of a trained epidemiologist makes a book full of interest and educative value to those interested in Preventive Medicine.

The scheme of the volumes is the same materially for each disease dealt with. In general, for each malady there is a definition, an historical account, a discussion on the virus, the methods of infection, the susceptibility and prevalence, the incubation, and methods of control. Symptomatology and pathology are also included; for as the author truly observes such cannot be wholly divorced from epidemiology. The details under these subheads may be extensive or otherwise according to the opinion of the author as to their import from the main point of view of disease



prevention. The historical accounts are especially interesting and instructive and add in no mean way to the value of the work. Much is to be learned from the history of past epidemics.

There is in these two volumes a vast store of fact and information, not infrequently accompanied by quotations of extracts from original papers of investigators. To these are at times added the comments of the author, who gives his own considered and oft-times cautious opinion. One cannot fail to note how very largely experience gained during, or as a result of, the late war has been drawn upon in giving examples.

Large as these volumes are, one cannot at times but wish for more than they contain. There are certain omissions on which one would have valued the opinion of the author. Thus, there is no reference to the findings of the Committee of Enquiry regarding the prevalence of Pellagra amongst Turkish Prisoners of War, held in Egypt in 1918, which concluded that the disease was due to a deficiency in protein as gauged by its biological value.

One would have welcomed further information in the section dealing with Plague, especially as regards the rat and rat fleas. Medical men must nowadays perforce take considerable interest in zoology and especially entomology. Some account of the plague carrying fleas would not have come amiss, and surveys of the fleas of the genus *Xenopsylla*, occurring upon rodents of districts liable to plague infection, promise to be of great practical value for forecasting the probable incidence of the disease. Amongst the rat poisons, barium carbonate and squill receive no mention; on this side of the Atlantic, however, they are regarded with more favour than phosphorus and arsenic, which are advocated by the author. In the chapter on Typhus there is no reference to "*Rickettsia*" in that portion devoted to discussion of the virus. Similarly in Sandfly Fever no mention is made of certain spirochaetes which have been described within the last few years, and which are generally believed to be the causative organism.

But few of the statements in the book are open to challenge. One such however occurs on p. 830 of volume II, where in speaking of Persian Relapsing Fever the following is written: "Its distribution is a tick, *Argas persicus*." This statement, though the suggestion has been made by some observers, would be open to question and comment.

The book is written in a pleasant style which makes it very readable, and there is an abundance of illustrative graphs. The printing and the paper are good and the size of type used is convenient. The work may be confidently recommended as one which will justify in full its position in the library of those whose call in life is Preventive Medicine, whether they work in temperate or tropical climates.

G. E. F. Stammers.

THE ROCKEFELLER FOUNDATION. **Annual Report. 1922.** pp. xiii. 451. With 85 figs. New York. The Rockefeller Foundation, 61, Broadway.

This final report for the year 1922 includes, besides the President's review and the reports of the Secretary and Treasurer, which have been noticed already (see this *Bulletin*, Vol. 20, p. 856), the reports of the director of the International Health Board, of the director of the China Medical Board, and of the general director of Medical Education.

Amid a number of miscellaneous items, the progress of organized measures for the control of yellow fever, malaria, and hookworm occupy a prominent place in the report of the International Health Board. An epidemic of yellow fever in Peru was overcome and an incipient outbreak in Honduras was checked, and in other parts of tropical America this disease was suppressed and *Stegomyia* subdued. Antimalaria operations included the inauguration and prosecution of field studies in Brazil, a

continuation of work in Nicaragua, the projection of surveys in Italy and in the Philippines, and co-operation in measures undertaken by the Government of Palestine. It is worthy of note that in a district of North Carolina, where other measures of malaria control were impracticable, administration of quinine is said to have brought about a reduction of 80 per cent. of incidence among the white population and 66.5 per cent. among the black. Large measures of hookworm control, which were begun in Virginia in 1910, and have extended in widening circles over America and Asia ever since, are still in process of being released to the various Governments directly concerned; but fresh ground is still being broken, and a survey is proposed for Spain. Among other activities of this Board during 1922 may be mentioned, anti-tuberculosis operations in France, which were gradually being resigned to the French authorities; the creation and encouragement of county health units, for the preservation of public health in small towns and rural areas, in the United States and in Brazil; assistance towards the installation of public health laboratories in various parts of the world; organization of a public nursing service in Brazil; co-operation with the Health Board of the League of Nations and also in the organization of a comprehensive public health authority in Czechoslovakia; and extensive assistance to technical education in hygiene and public health by grants for the establishment and equipment of appropriate schools in the United States, Brazil, and London, and by the endowment of fellowships, of which during the year 79 were granted to individuals representing 19 countries, for which an expenditure of 167,500 dollars was allotted.

The China Medical Board completed the 8th year of its active existence in 1922. In its report the Peking Union Medical College, which in June completed its first year of work in association with the new hospital, occupies a conspicuous place. [For some account of this institution see this *Bulletin*, Vol. 18, p. 146.] In the new hospital, during the year ended 30th June, the number of inpatients treated was 2,653, of which about one-third were women, and the number of outpatients' visits was 74,763; the number of autopsies was 33—only 21.5 per cent. of the number of deaths—the native prejudice against this form of research being still very strong. The health of the students and the junior Chinese staff of the College caused some concern in the matter of tuberculosis. In 1922 the China Board concentrated its efforts on the improvement of premedical education—i.e., practical teaching in physics, chemistry, and biology—in existing institutions in China. To this end grants were made for buildings and equipment, and for maintenance for a term of years, to the Universities of Nanking and Tientsin and to the Mission University of Peking, and assistance was also given to the Christian College of Canton, the St. John's University of Shanghai, the Fukien Christian University, and the Changsha Yale College. Beyond this, maintenance grants were made to six mission hospitals, and building grants to five, and fellowships and scholarships were granted to teachers and to missionary doctors, to an aggregate amount of 48,000 dollars, for the purpose of study in the United States and Europe.

The report of the General Director of Medical Education includes the details of divers fresh enterprises. These comprise undertakings to assist in the complete reorganization of the Royal Medical College of Bangkok, and of the Medical School of São Paulo, and to contribute, conditionally, 2½ million dollars towards the building and equipment of the medical college of the University of Iowa, the endowment of two chairs (surgery and medicine) in the University of Hong Kong, and the institution of research fellowships of which 26 were granted during the year on an allotment of 56,200 dollars.

The total disbursements of the Rockefeller Foundation for the year 1922 amounted (not including six million dollars given to Johns Hopkins University) to 9,911,408 dollars.

A. Alcock.



COOK (Albert R.) [C.M.G., O.B.E., M.D.] & COOK (Katharine) [M.B.E.]. **Amagezi Agokuzalisa (Ekitabo Ekitegeza Ebyokuzalisa).** (**Manual of Midwifery, in Luganda.**)—pp. xii. + 228. With 1 plate & 28 figs. London: The Sheldon Press, Northumberland Avenue. [Price 2s. 6d. net.]

It is obviously impossible for one who has no knowledge of the language in which a book is written to review it in the ordinary way, but, thanks to the excellent preface, to the table of contents, and to the frequent use of English and Latin words throughout the text, a fair idea can be obtained of the scope and general character of this elementary book on midwifery in the Luganda language. The whole subject, including brief chapters on general anatomy and physiology, venereal diseases, hygiene and sanitation, and some tables of prescriptions, is compressed into 225 small pages. The book, therefore, must be rather of the nature of a notebook; but the authors remark, very reasonably, that it is important to make a start, and "to get something into print which can be hammered at, and shaped by actual experience in the class-room and hospital wards."

Dr. and Mrs. Cook draw a very sombre picture of the public health in the Uganda Protectorate. The statistics, kept over a long series of years at the Mengo hospital, show that 17–20 per cent. of the natives are suffering from active venereal disease, and that 80 per cent. have, by their own admission, had syphilis at one time or another in their lives. It should be remembered, however, that these statistics were presumably obtained from persons who sought admission to the hospital because they were ill, and it does not necessarily follow that the figures are applicable to the population at large. And the same criticism may be made of the statement that two out of every three Baganda mothers have had syphilis at one time or another. Nor, as the authors admit, can one attach implicit faith to the official birth and death returns, which, for the seven years 1914–1920, were respectively 219,854 and 228,666.

In 1919 organized training of native midwives was begun. Only girls of a fair general education are accepted for training, and the course lasts from one to two years; three contingents have already passed out of the school. The authors speak enthusiastically of the intelligence of the Baganda. The reviewer, who has had some experience of the training of native midwives in the East, is agreeably surprised to learn that it is apparently possible to select only those "of a fair general education," and that no reference is made to any difficulty being found in obtaining a sufficient number of students.

The book appears to be an excellent one, and well calculated to accomplish the object which the authors have in view. It contains about two dozen good illustrations and diagrams, reproduced from established textbooks. The binding and printing are admirable, and, thanks to a generous grant from the Government of Uganda, the book is for sale at a very moderate price.

H. J. Walton.

SOCIETY FOR PROMOTING CHRISTIAN KNOWLEDGE. **Tropical Hygiene for African Schools.**—64 pp. With various figs. 1922. London: S.P.C.K. House, Northumberland Avenue. New York & Toronto: The Macmillan Co. [Price 8d. net.]

We imagine that the aim of a primer of hygiene for schools, whatever their clime, should be to impart the material of a few mental pictures wherein the child can recognize itself and its familiar surroundings under improved sanitary conditions. The young African, for instance, should be led to idealize himself, sleeping perhaps under a mosquito-net, in a clean dry weather-tight hut, in a clean unobstructed well-drained village standing well clear of jungle and swamp; to picture himself performing his



due matutinal purifications in places set properly in bounds apart; to imagine the elders of his village jealously guarding the common sources of the drinking-water from outrage: he should, in brief, be impressed with the lurking dangers of his environment and should be led towards some understanding of the ways whereby, under Providence, he can protect himself.

The little sixty-four page treatise, entitled "Tropical Hygiene for African Schools," under review is too diffuse and desultory and deals too much with unfamiliar (and unexplained) detail to convey any clear sanitary lessons to African children. It contains too many technical terms and too much that is not hygiene at all—such as the treatment of haemorrhage and of various kinds of accidents and the management of specific fractures. It states no great simple truths and enforces no wide principles of sanitation. Its picture of a microscope, with every part named but not explained, is, alas, its fitting emblem.

A. Alcock.

RIVERS-SMITH (S.). [O.B.E., M.A.(Cantab.), Director of Education, Tanganyika Territory.] **Afiya. Kitabu kwa School za Afrika ya Mashariki.** [Health. A School Book for East Africa.]—pp. x + 110. With 33 figs. 1923. Calcutta, Bombay, Madras and London: Macmillan & Co., Ltd.

In this little book, written in Ki-Swahili, entitled *Health*, the author, who is the Director of Education in Tanganyika Territory, in his English preface points out the important place hygiene should take in the administration of our African colonies and sees in the native schools a means whereby some of the elementary principles of that science may be inculcated on the younger generation. The book is intended for use in these schools as a kind of text-book and is, we believe, the first of its kind. In Ki-Swahili the author is lucky in having a medium giving a range of expression not afforded by every African language, and on the whole he has succeeded in his task and produced a book for which there was a real want. In successive chapters the conception of health and disease is explained, clean air, clean water, good food, etc.; the functions of some of the organs of the body are next dealt with, followed by sections on the parts played by mosquitoes, flies and rats in the spread of disease and how these pests may be dealt with, and, lastly, there are short chapters on ankylostomiasis, consumption, bilharziasis, ulcers, yaws, etc. The following few criticisms may be offered, though the reviewer is aware that the evidence afforded by natives using the book will be of greater value in serving to show where any modification may be useful in subsequent editions.

One feels that the author goes a little too deeply into questions which the native will hardly comprehend, questions about which the average European resident in East Africa knows little and about which it is unnecessary for him to know more. The subject matter of some chapters is a little uneven; thus in dealing with the prophylaxis of plague much space is given to rat destruction, but the use of anti-plague inoculation is dismissed in a single sentence; in the same way the epizootic among rats might have been better explained. Allusion may also be made to the question of illustrations. Illustrations in books may have one of two functions, either to attract the reader, generally the illiterate reader, or to further the explanation of some point of the text when concrete examples are not to hand. In such a book as that under review the illustrations should belong to the second category, whereas they savour of the former. The picture of a bad type well is almost undecipherable on the one hand and on the other the diagrammatic representation of a good type—European built well and pump—must be a little difficult for the native to interpret. If the book is to be of practical value it must show the native methods he can himself adopt. The illustrations of a human heart, of a

rat, of a male and female hookworm, are poor, and can surely serve little purpose. In future editions one would like to see either no illustrations, the teacher depending entirely on concrete examples, easily obtained, or the illustrations should be of a better order and more useful.

In some chapters the question and answer method has been used, quite a useful one, but if used, should it not be adopted throughout?

The book, as the author says, is an innovation, and its value will increase with further experience and subsequent editions.

H. S. Stannus.

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